

CHINA'S ANTI-SATELLITE TEST: A PRECURSOR TO CHALLENGE U.S.
FREEDOM TO MANEUVER IN SPACE?

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General Studies

by

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14. ABSTRACT On January 11, 2007, the Peoples Republic of China (PRC) launched a direct-ascent anti-satellite (ASAT) weapon and destroyed one of their satellites. Uncovering Chinese motivations for this action has been problematic because the Chinese government has given virtually no explanation for this act. China seems to be actively attempting to challenge other nation's freedom to maneuver in space. Thus, the central research question is: Is the motivation behind current Chinese efforts in its ASAT program to challenge U.S. freedom of maneuver in space? China is not without precedent. During the 1960's to the late 1980's both the U.S. and U.S.S.R. conducted extensive ASAT tests in the development and deployment of ASAT weapons as part of their military space programs. In the Case of the U.S.S.R., ASAT weapons were extensively tested and deployed, but their relatively low success rate and marginal military value led the Soviet government to abandon the program in favor of arms control negotiations. In the Case of the U.S., ASAT was another component to ensure national security of all space assets. The U.S.S.R. study illustrates the inherent political instability of pursuing space weapons, while the U.S. study illustrates the political desire to remain weapons free in space, but retain the right to defend space assets with force if necessary. China, with its notion of active defense and deterrence doctrine, would seem to align closely with the U.S. in ASAT employment, and not challenge U.S. freedom of maneuver in space per se, but ensure its own freedom of maneuver in space as it continues to grow its dependence on space assets in the future.					
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The opinions and conclusions expressed herein are those of the student author and do not necessarily represent the views of the U.S. Army Command and General Staff College or any other governmental agency. (References to this study should include the foregoing statement.)

ABSTRACT

CHINA'S ANTI-SATELLITE TEST: A PRECURSOR TO CHALLENGE U.S. FREEDOM TO MANEUVER IN SPACE? by MAJ Fredrick W. Mahler, USA, 131 pages.

On January 11, 2007, the Peoples Republic of China (PRC) launched a direct-ascent anti-satellite (ASAT) weapon and destroyed one of their satellites. Uncovering Chinese motivations for this action has been problematic because the Chinese government has given virtually no explanation for this act. China seems to be actively attempting to challenge other nations freedom to maneuver in space. Thus, the central research question is: Is the motivation behind current Chinese efforts in its ASAT program to challenge U.S. freedom of maneuver in space?

China is not without precedent. During the 1960's to the late 1980's both the U.S. and U.S.S.R. conducted extensive ASAT tests in the development and deployment of ASAT weapons as part of their military space programs. In the Case of the U.S.S.R., ASAT weapons were extensively tested and deployed, but their relatively low success rate and marginal military value led the Soviet government to abandon the program in favor of arms control negotiations. In the Case of the U.S., ASAT was another component to ensure national security of all space assets. The U.S.S.R. study illustrates the inherent political instability of pursuing space weapons, while the U.S. study illustrates the political desire to remain weapons free in space, but retain the right to defend space assets with force if necessary.

China, with its notion of active defense and deterrence doctrine, would seem to align closely with the U.S. in ASAT employment, and not challenge U.S. freedom of maneuver in space per se, but ensure its own freedom of maneuver in space as it continues to grow a dependence on space assets in the future.

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ACRONYMS

ABM	Anti-Ballistic Missile
AFDD	Air Force Doctrine Document
ASAT	Antisatellite Weapon
BMD	Ballistic Missile Defense
C2	Command and Control
CIA	Central Intelligence Agency
DIA	Defense Intelligence Agency
DOD	Department of Defense
GPS	Global Positioning System
HEO	Highly Elliptical Orbit
ICBM	Intercontinental Ballistic Missile
IO	Information Operations
IW	Information Warfare
NASA	National Aeronautics and Space Administration
NRO	National Reconnaissance Office
NSA	National Security Agency
OST	Outer Space Treaty
JP	Joint Publication
LEO	Low Earth Orbit
MEO	Medium Earth Orbit
PLA	Peoples Liberation Army
PRC	Peoples Republic of China
SecDef	Secretary of Defense

SDI	Strategic Defense Initiative
TBM	Tactical Ballistic Missile
US	United States
USAF	United States Air Force
USSR	Union of Soviet Socialist Republics

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CHAPTER 1

INTRODUCTION

Background

The official Chinese government's position on the use and development of space calls for several peaceful initiatives. In the White Paper on China's space activities in 2006, China asserts that its aims in space are:

“to explore outer space, and enhance understanding of Earth and the cosmos; to utilize outer space for peaceful purposes, promote human civilization and social progress, and benefit the whole of mankind; to meet the demands of economic construction, scientific and technological development, national security and social progress; and to raise the scientific quality of the Chinese people, protect China's national interests and rights, and build up the comprehensive national strength.” The reason given for all of these initiatives are to help build Chinese society in a “well-off” and “all-round way” (2006, 1)

Peoples Republic of China, *China's Space Activities in 2006*

Despite China's declaration of a peaceful intent on the use of space, on January 11, 2007, the PRC conducted its first successful direct ascent anti-satellite (ASAT) weapons test (Library of Congress 2007, 1). The ballistic kill vehicle launched near China's Xichang Space Center successfully engaged a Fengyun-1C weather satellite 530 miles above the earth (Library of Congress 2007, 1). While the destroyed satellite was one of China's older weather satellites, this test confirmed what until then had been speculation that China had an active ASAT program. Not only did this successful ASAT test confirm China's capability to engage and destroy satellites, but it also displayed the Chinese government's willingness to use such technology.

The Chinese government gave no warning it was conducting this launch, and its foreign ministry did not issue a public statement until January 23rd. This statement

continued to reiterate China's peaceful use of space, and that the test was not aimed at any country (BBC News Website 2007).

Given that this event would cause adverse effects on most space-faring nations including the U.S.; the question is what China hoped to gain by conducting such a test? Furthermore, why did China not announce their explanations for the test immediately after it occurred? Finally, where does this action support and promote the Chinese policy of the peaceful use of space? Since then, China has been very quiet about its motivation for conducting the ASAT test leaving the world to speculate on the PRCs motivations.

The establishment of the Fifth Research Academy of the Ministry of National Defense in 1956 signified the beginning of the Chinese Communist Party's space program (Harvey 2004, 22). Since then, the PRC has steadily increased its capabilities in space. Many of the Chinese advances, such as China's first successful manned spaceflight in 2003 (Harvey 2004, 1), are publicly lauded by many other nations as noble attempts to explore and educate the Chinese people about space. Yet the Chinese Space program is still dominated by the military, and fundamentally secretive about its operations (Solome 2006, 312). While still lagging several years behind the U.S. in technological prowess, the PRC has now demonstrated their capability to affect much more sophisticated space platforms in use by many other space-faring nations, including the United States.

Statement of the Research Question

Chinese efforts to challenge U.S. Space freedom of maneuver is the focus of this paper. Specifically, this work will propose to answer the following primary research question: Are current Chinese efforts in its ASAT program designed to challenge U.S.

freedom of maneuver in space? If so, then what policy or program changes should the U.S. adopt in order to counter an emerging Chinese space threat?

In order to address the primary research question, it will be necessary to answer the following secondary questions:

1. What are current Chinese counter space efforts?
2. What is the current Chinese policy on the use of space?
3. What is the current Chinese policy on defense?
4. What is the current U.S. policy on the use of Space?
5. How does the Chinese view of U.S. space activities and policy threaten them?

This Paper proposes to research the organizational structure of the Chinese Space Program, and define their decision-making process. This paper will also examine the ASAT program in the context of China's strategic goals for space and national defense to and develop possible motives for their recent activities. Should this research lead to evidence that the Chinese agenda is to challenge U.S. freedom of maneuver in space; this paper will then explore ways in which the U.S. can counter these initiatives along diplomatic policy and program means.

Limitations and Delimitations

Primary anticipated problems are a lack of sufficient unclassified data. This research thus far has produced a limited number of open source information. The author will be able to access stated policies, and other public announcements, but hard technical data on current Chinese space platforms will most likely be classified.

Significance of this Study

While the Chinese government officially calls for the peaceful use of space, they have developed an ASAT capability. This capability, though arguably defensive in nature, can be perceived as a direct threat to U.S. freedom of maneuver in space. In light of the domination of the Chinese space program by the Peoples Liberation Army (PLA), it could be argued that the PLA intends to challenge U.S. freedom of maneuver in space using ASAT weapons. Should a military conflict between China and the U.S. occur, the PLA could conceivably “blind” U.S. forces by denying them the use of space-borne intelligence, and even hamper the simplest operations by interfering with our Command and Control networks that are currently highly dependent on satellites.

CHAPTER 2

LITERATURE REVIEW

The author has collected many sources of information relevant to this thesis. For the US and USSR case studies, this literature is primarily in book form, and historical in perspective. Much of the literature researched addressing China's ASAT test and Policy mindset is relatively recent, since 2000.

US Case Study

Beginning in 1958, The Eisenhower administration issued "The National Security Council, NSC 5814, U.S. Policy on Outer Space." This Presidential directive published under the Eisenhower administration is considered the first U.S. Space policy. This policy was published shortly after the Soviet Union launched Sputnik.

This policy contains several forward-thinking initiatives on the part of the Eisenhower administration on what the U.S. must accomplish in the space realm. The Policy begins by outlining the growing importance of space for both military and civilian purposes. It also clearly outlines the psychological impact of a space program, and states that such a program will increase national pride and international prestige.

The policy addresses the problems of legal definition of "outer space" versus "air space" and foresees a problem with a legal definition for where one ends and the other begins. It also relays that this issue will undoubtedly be presented to the next U.N. General Assembly meeting, and the U.S. should advocate a position on the use of space for peaceful and scientific purposes only. This report also calls for the need to create a favorable political framework in which reconnaissance satellites could work.

Additionally, the U.S. should rapidly develop its space program in order to catch up to Soviet space activities, and counter any claim over sovereignty that Soviets may give over celestial bodies like the moon. The policy also prioritizes military space efforts, with priority going to ballistic missiles, followed closely by military reconnaissance satellites. Other priorities include weather observation, communications, electronic countermeasures and navigation aids. Finally, this policy calls for the need to create a civilian space agency to have oversight for all U.S. space activities, except those that fall within national defense (i.e. military), which will be under the control of the Department of Defense.

This policy provides excellent source material into the early formulation of U.S. space policy. What is most striking is that the utility of space assets was identified before the U.S. had even launched its first satellite. This early policy emphasizing the international prestige benefits of a space program lends credence to the notion that the Chinese must have viewed their space efforts in much the same way.

In 1961, President-Elect Kennedy initiated the Ad Hoc Committee on Space. This committee was also known as the “Wiesner Committee.” The Wiesner Committee report to President-Elect Kennedy was part of the transition teams set up to advise him on issues he would face upon assuming his Presidency. This report, chaired by Professor Jerome Wiesner of the Massachusetts Institute of Technology (MIT), was established to advise Kennedy on science and technology issues. The Ad Hoc Committee on Space specifically examined the U.S. space program, and made recommendations for future space policy.

This reports primary impact was to criticize the poor management and oversight

of the U.S. space program. It particularly noted a lack of coordination and communication between NASA, the Department of Defense, and the Army, Navy, and Air force space activities. This lack of oversight was the chief cause of expensive duplication of efforts, and inefficiency. The report recommended a centralized body be formed to have primary responsibility for all three Service space programs. In order to accomplish this, the report recommended restructuring the National Aeronautics and Space Council to establish the Council in the Executive Office of the President. The Vice President would chair this Council, and members would include the Secretary of State, Secretary of Defense, the NASA Administrator and the Chairman of the Atomic Energy Commission. Because of this report, Secretary of Defense Robert McNamara issued Defense Directive No. 5160.32. This directive allowed all three services to conduct preliminary research in new space technology, but once approved by the Secretary for development, all technologies would become the responsibility of the Air Force.

This report provides insight into the historical organizational problems within the U.S. space program, and its continued struggle between NASA and the Department of Defense for priority of resources.

In 1978, President Carter issued “Presidential Directive/NSC-37, National Space Policy.” This Presidential Directive was the result of a comprehensive review of U.S. space policy by the Carter administration. It was primarily concerned with the relationship of the U.S. space program and national security. The review was conducted under the auspices of the National Security Council, and established a National Security Council Policy Review Committee chaired by the Director of the White House Office of Science and Technology Policy, as a means to formulate space policy.

This policy supported Carter's "Two-track" policy of arms control negotiations with the Soviets to limit ASAT proliferation, while maintaining a strong ASAT research and development program as a hedge against negotiation breakdown. Additionally, the ASAT program could be used as a bargaining chip in the arms negotiations. This policy was the most declaratory up to that point about the status of U.S. space assets. This policy directed that U.S. space assets were of vital interest to national security, and an attack on a U.S. space asset would be considered an infringement upon sovereign rights. This was the first space policy that asserted the U.S. will pursue activities in space in support of its right of self-defense.

This policy signified a marked difference to the previous administrations because it openly asserted the U.S. right to defend its reconnaissance satellites, and carried a harsh tone intended to let the Soviet Union know the U.S. favored arms negotiations, but would be prepared to act decisively in the event of continued Soviet ASAT development. Furthermore, this policy would set the tone for following presidential administrations to the present day.

In 1982, President Reagan issued "National Security Decision Directive Number 42, National Space Policy." This Policy was the first space policy given by the Reagan administration and superseded President Carter's NSC-37 space policy. This report was the result of another comprehensive space policy review by President Reagan's Science Advisor, George Keyworth II.

This policy, in line with the Reagan administration's support for the Strategic Defense Initiative (SDI), presented an even harsher tone concerning Soviet engagement on space arms control. While the Carter administration favored arms control as a

preferable means to curb space weaponization and ASAT development, this policy's tone stated that it would "study space arms control options" and "consider verifiable and equitable arms control measures" (U.S. President 1982, 2). This change in tone signified a shift in presidential preference from arms control as a primary means to curb space weaponization, to space weapon development as a deterrent to the Soviets to deploy space weapons.

In 1985, Dr. Paul Stares published his book entitled "*The militarization of Space: U.S. Policy, 1945 – 1984.*" Dr. Stares is a Research Associate at the Brookings Institution in Washington D.C. He received his Ph.D. from the University of Lancaster, England.

Dr. Stares' book provides an in-depth examination of the evolution of U.S. space policy from its beginnings shortly after World War II, to the mid-1980's. His book focuses on U.S. space policy, and how it related to the development of space weapons, primarily ASATs. He examines the significant historical events that shaped the U.S. military space program, including the development of reconnaissance satellites, communications satellites, and ASATs. He then discusses their impact upon the world, and primarily the chief U.S. adversary at the time, the Soviet Union.

Dr. Stares discusses the political interactions between the U.S. and the Soviet Union as they both struggled to legitimize the use of their military space assets, and prohibit the other side from developing a comparable capability. He also provides a thorough look into the U.S. ASAT program; and how it met with challenges and triumphs throughout succeeding presidential administrations. Beginning with the initial nuclear-armed ASATs in the 1950's, to the co-orbital ASAT programs of the 1960's and 70's, to

the direct-ascent ASAT program of the 1980's, Dr. Stares discusses each program, and the reasons for its inception, and decline. Dr. Stares then discusses his observations as to why the U.S. and U.S.S.R. remained remarkably restrained in their development of ASAT weapons throughout the 1960's and 1970's. Compared to what could have happened if both nations had decided to forego arms negotiations in favor of weaponizing space.

Finally, Dr. Stares predicts that the U.S. and the Soviet Union are inevitably headed for another space arms race due to the initiatives under President Reagan to develop the Strategic Defense Initiative (SDI) and the administration's lack of interest in arms negotiations. Dr. Stares argues that the Reagan administration's policy of pursuing better weapons as a deterrent to Soviet aggression will cause the Soviets to respond in kind, finally leading to the space arms race that each nation had tried hard not to engage in the past.

In 1987, President Ronald Reagan published "The U.S. Anti-Satellite (ASAT) Program: a key Element in the National Strategy of Deterrence." This Presidential paper was written in response to the congressional curtailment of funding for the U.S. Air Launched Miniature Vehicle (ALMV) ASAT program. In this paper, President Reagan presents the case of the threat the Soviet Union is to the U.S. with its strategic nuclear assets. He also notes that the Soviets possess the world's only operational ASAT system, and they effectively possess the capability to destroy U.S. satellites. An operational U.S. ASAT capability is the only response to ensure effective deterrence of Soviet ASATs. Finally, President Reagan decries the utility of ASAT arms control agreements due to an effective ability to verify compliance with such a treaty.

In 1993, the Air University published the “Space Handbook: a Warfighter’s Guide to Space.” This work was prepared at the Air University at Maxwell AFB. This text primarily presents a historical account of the use of space by the warfighter. Of primary relevance for this text is its historical account of the evolution of U.S. Space Policy, beginning with President Eisenhower, to President Reagan. This work references the various policies and directives issued under these administrations. Additionally, this work outlines the various space projects pursued under each administration, with an eye to their relevance to national security.

In 1996, The White House National Science and Technology Council published the fact sheet on National Space Policy. This space policy was issued during the Clinton administration and is the previous U.S. Presidential Space Policy. While similar to the current (2006) space policy in many respects, this policy differs with the 2006 policy in its acceptance of arms control. In this policy, the U.S. will consider arms control and related measures governing activities in space, and will conclude agreements on such measures if they are equitable and effectively verifiable and enhance the security of the United States.

In 2001, Donald Rumsfeld chaired the “Report of the Commission to Assess United States National Security Space Management and Organization.” This report was a commission to assess the organization and management of space activities in support of U.S. national security. The Commission unanimously concluded that the security of the U.S. depends upon the nation’s ability to operate in space. It is in the interests of the United States to promote the peaceful use of space; use the nation’s potential in space to support domestic, economic, diplomatic, and national security objectives; and develop

and deploy a means to deter and defend against hostile acts directed at U.S. space assets.

This report concludes that the U.S. military is heavily dependent upon space assets that are extremely vulnerable to attack. This report also identifies potential threats, and identifies China as one nation that is developing the capability to attack U.S. space assets. This report then recommends that in order to avoid a “space pearl harbor,” the U.S. should develop a means capable of defending its space assets. This includes methods of making space assets less vulnerable to attack (also known as hardening), and developing an effective deterrent to any force considering utilizing space weapons to attack U.S. space assets. In effect, this report argues in favor of developing ASAT weapons.

In 2002, President Bush issued “National Security Presidential Directive/NSPD-23.” This directive from President George W. Bush highlights the need to defend the U.S. from hostile forces as was seen in September 11, 2001. This directive notes that the U.S. faces a threat from a possible weapon of mass destruction greater than ever before. Hostile states such as North Korea are actively developing ballistic missile technology, and they may sell such technology to other nations, and non-state actors who harbor hostile intentions towards the U.S. Therefore, this directive re-asserts the importance of the national Ballistic Missile Defense Program (BMD), and specifies to the Secretary of Defense, and the Military to develop and field such BMD systems to be operational by 2005.

In 2006, The Bush administration issued its National Space Policy. This policy is the latest U.S. national space policy and is currently the basis for military space doctrine.

This policy is founded upon basic principles that define space activities. These principles include:

1. “Peaceful purposes” of space allow U.S. defense and intelligence-related activities in pursuit of national interests (U.S. President 2006, 1).
2. The United States rejects any claims of sovereignty by any nation over outer space or celestial bodies, and rejects any limitations on the fundamental right of the U.S. to operate and acquire data from space (U.S. President 2006, 1).
3. The United States considers space systems to have the rights of passage through and operations in space without interference. The U.S. will view purposeful interference with its space systems as an infringement on its rights (U.S. President 2006, 1).
4. The United States considers space capabilities vital to its national interests. The U.S. will preserve its rights, capabilities, and freedom of action in space; deter others from impeding those rights; take actions necessary to protect its space capabilities; respond to interference; and deny adversaries the use of space capabilities hostile to U.S. national interests (U.S. President 2006, 1).
5. The United States will oppose the development of new legal regimes or other restrictions that seek to prohibit or limit U.S. access to or use of space. Proposed arms control agreements or restrictions must not impair the rights of the U.S. to conduct research, development, testing, and operations or other activities in space for U.S. national interests (U.S. President 2006, 2).

This policy also directs the Secretary of Defense with developing capabilities to ensure U.S. freedom of action in space, and deny such freedom of action to adversaries.

In 2008, Dr. Laura Grego wrote an article entitled “Space Weapon Basics: a history of Anti-Satellite Weapons Programs.” Dr. Grego is a staff scientist with the Global Security Program. She has a Ph.D. in physics from the California Institute of Technology, and a B.Sc. in physics and astronomy from the University of Michigan.

Dr. Grego recounts a brief history of the ASAT weapons programs from both the U.S. and former Soviet Union. She illustrates both countries ASAT efforts from the 1960’s to today. Dr. Grego describes the Soviet’s co-orbital ASAT program, the U.S. *Mudflap* and AMLV systems, and discusses ASAT development projects such as the U.S. MIRACL laser and KE-ASAT systems.

Finally, Dr. Grego discusses the development of new ASAT capabilities, and asserts that the current 2006 U.S. space policy allowed for funding increases to numerous ASAT programs to continue to develop new technologies such as improved kinetic-kill vehicles, directed energy lasers, and smaller “parasitic microsattellites”.

USSR Case Study

In 1963, Marshal V.D. Sokolovsky published “Military Strategy.” This book was a collective work of leading Soviet military theoreticians. Initially published in Moscow in 1962, it has been considered the most authoritative document on Soviet military thought to reach western readers. This book’s subject matter covers a wide range of general concepts in military strategy, and provides an unclassified look into the Soviet

view of warfare, strategy and its relation to politics, and the preparations a nation must undergo to successfully conduct war.

Most relevant to this thesis are passages in this book that relate to future warfare and space. This book addresses the emerging need Soviet strategic forces place on space assets, and argues that there is a need to protect these assets. Additionally, the book identifies the growing threat of capitalist forces, and the need for the Soviet Union to develop its own space weapons capability to counteract the threats from the west.

This book is valuable in providing a historical perspective in the Soviet military thought process with regards to space operations at the dawn on the Soviet space program.

In 1965, the Soviet General Staff published the “Dictionary of Basic Military Terms.” This book is the third in a series of 17 books that are referred to as the “Officer’s Library.” This series of books was published at the behest of the Soviet Ministry of Defense in an effort to standardize Soviet Officer Education. The faculty at the Soviet General Staff Academy, the highest military educational institution roughly equivalent to the U.S. National War College, compiled this book.

This book was useful in defining tactical, operational, and strategic terms used in Soviet military thought. This is an excellent baseline source of information as many of the terms used in western doctrine have different definitions than their Soviet counterparts. This book clarified Soviet concepts of terms relating to space, anti-space defense, and air defense.

In 1984, the Defense Intelligence Agency (DIA) created a report on Soviet Military Space Doctrine. This report published by the DIA was an attempt through

intelligence collection to define the Soviet military space doctrine. Since there is no officially acknowledged military space doctrine from Soviet unclassified sources, and the Soviets publicly state they do not have a military space doctrine, this report was generated to estimate what the classified Soviet military space doctrine must be.

To derive the Soviet military space doctrine, this report referenced several Soviet published works on military strategy in general, and any references these works make to the use of space. The report analyzes references to space and warfare in Marshal Sokolovsky's *Military Strategy*, the Soviet *Dictionary of Basic Military Terms*, and the *Soviet Military Encyclopedia*. This report notes that the Soviets had a shift in reference to space weapons development prior to, and after the Outer Space treaty of 1967. Prior to this treaty, Soviet senior military leaders advocated for the development of space capabilities, and space weapons in response to a growing western threat. After the 1967 treaty, the Soviet leadership tried to present an image of anti-space weaponization to the world. As such, all doctrine subsequent to the Outer Space treaty did not reference space weaponization, or advocate for it.

Despite the public denial of a military space doctrine, this DIA report argues that the Soviets simply disguised their thoughts on space weapons development by labeling such references to space weaponization as "foreign" concepts. The report states that labeling these concepts foreign allows the Soviet command to discuss such topics, without admitting that they are part of Soviet doctrine. In effect, the Soviets have a military space doctrine; they simply politically mask it as a western concept.

In conclusion, the report states that by carefully connecting the pieces related to space and warfare in published Soviet doctrinal manuals, a Soviet military space doctrine

becomes apparent. This doctrine, as estimated by the DIA, proclaims that the Soviet armed forces will be provided with all resources necessary to maintain military superiority in outer space, and sufficient force to deny the enemy the use of space to assure maximum space-based military support for offensive and defensive combat operations.

This report was useful in providing notes to Soviet military publications and their references to space. While this report does seem to emphasize the adversarial nature of the Soviet Union, it was a useful starting point in allowing the author to further research Soviet military doctrine and its relation to space.

In 1985, Dr. Hensel published a book entitled “The U.S.S.R. and Outer Space: Soviet Media Images of Superpower Space Policy.” Dr. Hensel has been a Professor on the faculty of the Air War College since 1986 and currently serves as the Deputy Chair and Course Director for the Department of Strategy and Leadership. Dr. Hensel provides a unique perspective on the U.S./Soviet space arms race of the 1980’s by examining Soviet media reports upon the ASAT efforts of the U.S. and U.S.S.R.

Dr. Hensel’s book discusses the Soviet media’s perspective on American objectives in space. Dr. Hensel illustrates how the Soviet media was consistent in its portrayal of U.S. space policy and activities as inherently hostile to the world in general, and continued U.S. ASAT efforts as destabilizing to the peaceful use of space. Additionally, the Soviet media continued to portray the Soviet Leadership as pioneers in the effort to de-weaponize space, and were continually trying to engage the U.S. through diplomatic means in order to stop the U.S. from militarizing space.

Dr. Hensel then proceeds to interpret Soviet motivations for their diplomatic efforts to reach an arms control agreement over ASAT and nuclear weapons. Dr. Hensel illustrates two thoughts on Soviet motivations:

1. The Soviet Leadership believes in the idea of mutual societal vulnerability to nuclear retaliation as a basis for nuclear deterrence. Therefore, ASAT employment could lead to a space “arms race” which would destabilize the current nuclear deterrent capabilities of both nations. This interpretation would lend credibility to the Soviet diplomatic efforts of arms control as their primary means of genuinely trying to make space a peaceful realm.
2. The second thought is that the Soviet Leadership does not believe in mutual societal vulnerability, but will fight according to their military doctrine of destroying the enemy’s capability to fight, while preserving a military and economic command structure to dominate the post-war era. This interpretation lends credibility that the Soviet Leadership is using a diplomatic effort to buy time for their space industry to develop better space weapons than the U.S. Once these weapons are available, the Soviets will not hesitate to use them as a means to destroy the U.S. capability to respond to a nuclear first strike. A weak and uncoordinated nuclear response, coupled with an effective ability to protect critical military and economic nodes in the U.S.S.R., is an acceptable cost for a victory for the Soviets.

Dr. Hensel then asserts that the closest thought would be a combination of the two previous thoughts. Dr. Hensel does not assume that the Soviet Leadership is as monolithic in its policy as these previous thoughts would lead one to believe. Rather, the Soviet Government had numerous factions within it, each arguing for its own motivation.

At the time of his book, Dr. Hensel believes that the current Soviet Leadership is more agreeable to the idea of mutual societal vulnerability, but current U.S. developments in ASAT and ABM weapons could cause the Soviet Leadership to change to a more confrontational posture, and re-invigorate their own ASAT program.

In 1987, the United States Department of Defense published a report entitled “The Soviet space challenge.” This report was produced by the Reagan administration in an effort to illustrate the threat that the Soviet military space program posed to U.S. national security. This report, with a preface authored by then Secretary of Defense Caspar Weinberger, provides a brief history of the Soviet space program. It also states that while the Soviets do not officially have a Soviet military space doctrine, U.S. intelligence analysis derived that the Soviet space program primarily exists to enhance the Soviet military, and that they will use space assets to enable the Soviet Army to fight and win their nation’s wars.

Additionally, this report discusses Soviet space activities such as their COSMOS satellite program, their SALYUT space station program, and their Co-orbital ASAT program. The report states that the Soviets, contrary to their propaganda on peaceful use of space, are continuing to develop a military space program and that this program will become more robust in the future.

Finally, the report iterates the importance of space to U.S. national interests, and that the U.S. will continue developing its own space assets capable of countering the growing Soviet space threat, and deterring them from acting against the U.S.

In 1989, Congress issued a report for the Honorable Ernest F. Hollings, Chairman of the Committee on Commerce, Science, and Transportation entitled “Space Programs:

1981-87; space science, space applications, military space programs, administration, resource burden, and master log of space flights.” The purpose of this congressional report was to illustrate the Soviet Space Program’s activities from 1981-87. The primary focus of this report was to detail the changes to the Soviet Space Program under Premier Gorbachev, and provide analysis into the possible future effects of his changes.

This report gives an exhaustive detail of every known space mission the Soviets conducted during this period. A comprehensive analysis of Soviet space science missions, space applications, military space activities, and the administrative and resource burden of the Soviet Space Program are provided to give the reader a thorough understanding of current Soviet space activities, and their possible relevance to U.S. policy. Of particular importance to this report is the analysis of Mr. Gorbachev’s creation of a Soviet civilian space agency called “Glavkosmos,” and his attempt to streamline the decision-making process within the space program. Glavkosmos would be roughly equivalent to NASA in terms of civilian space projects. However, the military would still be in firm control of military space activities, and none of Gorbachev’s new initiatives gave any indication that the Soviet military space program would be seriously affected.

In 1994, Ms. Mary C. Fitzgerald published her work on “The new revolution in Russian military affairs.” Ms. Fitzgerald is a research fellow in the Washington office of the Hudson Institute and an adjunct professor at the Air Command and Staff College in Maxwell Air Force Base.

Ms. Fitzgerald analyses the change in Russian military policy since the fall of the Soviet Union. Her assertion is that there is a recurring theme in the Russian politico-military leadership. This recurring theme is a continuing disproportionate emphasis on

military power as the nucleus for Russia's global status. Ms. Fitzgerald then proceeds to discuss the Russian views on the new revolution in military affairs. This is primarily illustrated by the lessons learned from witnessing the performance of the U.S. military during operation Desert Storm.

The Russian revolution in military affairs lies principally with the acknowledgement of the decline in the utility of nuclear weapons to deter future battles, and the need for enhanced combat capabilities from emerging technologies. Terms such as "high precision", "non-traditional" "third generation nuclear" and "information" are revolutionizing Russian military art and force structure. The new Russian military doctrine approved by president Yeltsin in 1993 calls for ongoing civil-military development of microelectronics, computer technology, machine-tool manufacturing, instrument-making, robotics and the entire information industry.

Ms. Fitzgerald contends that the Russian General Staff will continue to plan for an "air-space war". For the short term they have concentrated on countermeasures for superior western technology. For the long term, they have focused their limited resources to creating the infrastructure and technology necessary to surge production of needed air-space technologies. For the transitional period between the two, Russia has refined and restructured nuclear warfighting as a way to cope with worst-case scenarios and ensure the nation's security in the interim.

International Treaties

The 1967 Treaty on principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies, a multi-national treaty of which the U.S. is a signatory, is also known as the Outer Space

Treaty. This treaty was the second of the so-called “non-armament” treaties, and was modeled on its predecessor, the Antarctic Treaty. This treaty sought to prevent a form of colonial competition that self-seeking national exploitation might cause in the realm of space.

This treaty bans the placing of a nuclear, or any other weapon of mass destruction in orbit around the earth, on the moon, in outer space, or any other celestial body. Secondly, this treaty limits the use of the moon and other celestial bodies to peaceful purposes and prohibits their use for establishing military bases, installations, or fortifications; testing weapons of any kind; or conducting military maneuvers.

The 2008 Treaty on the Prevention of the Placement of Weapons in Outer Space, The Threat or Use of Force Against Outer Space Objects was a Joint Russia-China Draft treaty proposed by the Ministry of Foreign Affairs of the Russian Federation to the U.N. Plenary Meeting of the Conference on Disarmament in Geneva, 12 February, 2008.

In addition to defining outer space, and weapons in outer space, this treaty seeks to ban signatory parties from placing in orbit around earth any objects carrying any kind of weapons. It also bans signatories from installing any such weapons on celestial bodies, and stationing such weapons in outer space in any other manner. Signatories also pledge to not resort to the threat or use of force against outer space objects; not to assist or encourage other states, groups of states or international organizations to participate in activities prohibited by this treaty.

This treaty has not been ratified by the U.N. due to objections from the U.S. on its relevancy, and lack of verification protocols.

Chinese Policy and Doctrinal Mindset Literature

In 2000, and again in 2006, the Information Office of the State Council of the People's Republic of China issued reports entitled "China's Space Activities in 2000" and "2006" respectively. Also, known as White Papers, these reports produced by the Chinese government initially in 2000, are an illustration of China's space philosophy and goals and how they relate to China's national five-year plan, which broadly defines national priorities over a five year time period. These documents are meant to illustrate overall effort, and as such, their language is generalized and vague. These documents outline some themes within the Chinese space program that will undoubtedly shape and focus its priorities. They provide one of the few published materials from the Chinese government on the future of its space program.

In 2000, and again in 2006, the Information Office of the State Council of the People's Republic of China issued reports entitled "China's National Defense in 2000" and "2006" respectively. These public reports issued by the Chinese government are the closest thing to public policy on their national defense that is open source information. These White Papers on Defense are published as supporting documents to China's five-year plans, which are issued by the Chinese Communist Party on the road ahead for the Chinese nation over the next five years. While the five-year plan broadly addresses national development along economic, technological, social, and legal lines, the White Papers on Defense are specific to the Peoples Liberation Army.

These White Papers define the security situation as the Chinese view it and define the leading threats to Chinese national security. They also define China's national defense policy, which loosely describes the goals for the PLA such as upholding national

interests, restructuring the force, and incorporating the most advanced technology into military tactics. The White papers then specifically address initiatives within the PLA, the Peoples Armed Police Force (a police force charged with internal security), and National Defense Mobilization and Reserve Force (similar to U.S. national guard and reserves). All of these initiatives described relate to how each specific force will support the overall national defense policy. Finally, these White Papers discuss supporting initiatives to defense such as border and coastal defense, science and technology development, defense expenditure, and international security cooperation.

These White Papers, while generally broad in scope, and somewhat vague, were invaluable research materials to the author for gaining a broad perspective on how the Chinese view the role of their military in the future, and the priorities they place on its development. Through analyzing the changes in tone and language between the 2000 and 2006 White Papers, the author derived several working theories as to the Chinese motivations behind their ASAT program.

In 2002, two PRC Colonels published strategy papers that were later marketed as a book entitled “Unrestricted Warfare: China’s Master Plan to Destroy America.” Colonel Liang, of the PLA Air Force Political Department, and Colonel Xiangsui of the Guangzhou Military District PLA Air Force Political Department co-authored this book, which discusses how the introduction of new technologies is bringing changes in military tactics, strategies, and organization.

In the first part of their book, the Colonels discuss how innovations in new technologies are creating new types of warfare. In this new type of warfare, civilians as

well as soldiers will fight battles. New battlegrounds also include computer warfare, trade warfare, ecological warfare, terrorism, financial warfare and news media power.

The Colonels then discuss the lessons for China drawn from the 1991 Gulf War. They contend that the U.S. has invested in effective weapons, but is not willing to take many casualties. They argue that the American preference for complex weapons may well meet the global mission the U.S. sets for its military, but it may also get the U.S. into a quagmire. Because of this, the U.S. is not necessarily superior to any other country in its strategy and tactics. The Colonels argue that while the high-tech aspects of this new type of warfare will get the most attention, it will be superior tactics, and an imaginative combination of tactics and technologies that will win the wars of the future.

In 2004, Mr. Brian Harvey published his book on “China’s Space Program: From Conception to Manned Spaceflight.” Mr. Harvey provides a historical account of the Chinese space program from its beginning in the 1950’s to its most recent manned spaceflight in 2003. Mr. Harvey primarily concentrates upon the development of the Chinese Space program as an organization within the Communist Chinese government, and their various space projects.

Mr. Harvey historically details the challenges the early space program faced. These challenges were marked by technical and political problems that threatened to derail hard-fought progress on several occasions. Mr. Harvey also mentions on several occasions the political upheavals, most notably the Cultural Revolution in 1966, which threatened to wipe out the scientific community and deplete China’s intellectual capacity to design and build high-tech rockets, satellites, and missiles.

Mr. Harvey details the efforts of the Chinese space program to achieve capabilities equal to both the U.S. and the Soviet Union. China's initial efforts were to develop a sophisticated ballistic missile capable of supporting China's newly acquired nuclear weapons capability. Upon achievement of a nuclear ballistic missile capability, China pursued a satellite launching capability. These satellites were inherently military in nature, with programs such as the Fanhui Shi Weixing (FSW) project, which were China's first attempt at launching and recovering satellites with surveillance pictures on board.

Mr. Harvey then details the efforts of the Chinese to commercialize their launching capability. He remarks how this was an integral part of the Chinese need to infuse commercial innovation and allow the expensive space program to partially pay for itself. While initially successful, a series of costly failed launch attempts in the 1990's resulted in a general foreign loss of confidence in Chinese launch vehicles. Since then, China has continued to develop the quality and reliability of its rockets, culminating in the successful launch and recovery of its first astronaut, Yang Liwei. Mr. Harvey then proceeds to discuss the future endeavors of the Chinese space program. He makes note of the Chinese White Paper on space activities. This White Paper, which began being produced by the Chinese government in 2000, outlines in generic terms the philosophy and goals of the space program.

Perhaps most enlightening in the context of this thesis is that Mr. Harvey also makes reference to a related document, the 2000 White Paper on defense. This document outlines a 20% spending increase to respond to a "deteriorating international situation,

specifically a growing level of American hostility, hegemonism, and interventionism.”

Mr. Harvey concludes that this may reference funding to military space projects.

In 2005, Mr. Timothy L. Thomas published his book entitled “Cyber Silhouettes: Shadows over Information Operations.” Thomas discusses the emerging trend in the PLA on the importance of information warfare. The book remarks that the current transformation of the PLA is moving from a traditional mechanized force, towards a force capable of obtaining, managing, and controlling information.

Thomas then describes how China’s information warfare theory is close in detail to the U.S. Army’s definition of Information Operations. The major difference is that the Chinese believe information warfare occurs at all times, during peace and war, whereas information operations only occur during war. Thomas also lists the six forms of information warfare as operational security, deception, computer network attack, electronic warfare, intelligence, and physical destruction. Thomas then points out that the addition of computer network attack, and electronic warfare point to a dramatic change in the Chinese concept of warfare.

The new emphasis on these types of attacks on an enemy’s information systems gives insight into the motivation behind the Chinese investment in space systems. For without space assets, the Chinese would not be able to combat a high-tech enemy such as the U.S. in this realm.

In 2005, the CNA Corporation published a report entitled “China’s Revolution in Doctrinal Affairs: Emerging Trends in the Operational Art of the Chinese People’s Liberation Army.” This report, edited by James Mulvenon and David M. Finkelstein is a collection of papers presented at a two-day conference co hosted by CNA and the RAND

Corporation. The purpose of this conference was to discuss the paradigm shift in Chinese military doctrine from one of massive, combined arms maneuvers in the 1980's, to smaller, "local wars under high-tech conditions" (Mulvenon and Finklestein 2005, xi).

Of particular relevance to this thesis is the seeming reconciliation of the PLA between old doctrinal ideas, and new doctrinal employment of military force. The Chinese concept of preemption, or "active defense" is an example of an old doctrinal concept that seems to have been applied to the employment of ASATs.

This concept of active defense allows the Chinese justification in conducting a quick, decisive strike to their enemy's vulnerabilities before he has enough time to develop his combat power and overwhelm them. By pre-empting the inevitable attack, the prudent commander will buy time, and cause chaos in a technologically superior enemy so that he may feel compelled to delay, or forego his attack. This concept worked well for the Chinese in the past, when they chose to invade coalition-held North Korea, ensuing chaos in the enemy, and keeping the fight off their own soil.

This publication was useful in providing a good background into the Chinese paradigm shift of its doctrine, and its explanation of complicated, seemingly foreign doctrinal concepts was necessary in determining possible motivations for the Chinese ASAT test.

Chinese ASAT Implications Literature

In 1989, Marc J. Berkowitz published an article entitled "Antisatellites and Strategic Stability." Mr. Berkowitz is the director of space studies at National Research Inc. in Fairfax Virginia. He has published in the *Naval War College Review*, *Strategic Review*, *Armed Forces Journal International*, and the U.S. Navel Institute *Proceedings*.

Mr. Berkowitz addresses the arguments of critics of the U.S. ASAT program. He begins by examining the arguments these critics give as to why ASAT weapons contribute to strategic instability. Mr. Berkowitz outlines the major points of the ASAT instability argument by illustrating the following commonly held beliefs:

1. ASATs promote arms race instability. Should the U.S. pursue ASAT weapons, it will result in the Soviet Union essentially being forced to develop better ASAT weapons to ensure their own security, thus leading to a space weapons arms race.
2. ASATs promote crisis instability. Both the U.S. and U.S.S.R. rely heavily upon satellites for monitoring enemy actions, and maintaining communications. Should these vital satellites be destroyed in a crisis, it would result in a reduction in either side to effectively command and control their forces. This would undermine crisis-management and contribute to crisis escalation.

Mr. Berkowitz then makes the claim that the Instability argument for ASATs is flawed, and states that such an argument is based upon four basic assumptions that are not entirely true. He classifies these assumptions as 1) the cause of the United States-Soviet arms competition; 2) the threat posed by Soviet ASAT capabilities; 3) Soviet acceptance of (Western-defined) crisis-stability criteria; and 4) the importance of satellites for conflict limitation, control, and termination. Mr. Berkowitz then proceeds to discuss the flawed reasoning in each assumption in the following way:

1. The concept of ASATs creating a space arms race follows an “action-reaction” cycle between the two superpowers that have

not historically been true. He makes note that the Soviets have steadily built up their ICBM procurement over the past 20 years, despite that the U.S. slowed, and virtually ceased all strategic defense efforts. Mr. Berkowitz states that the Soviet drive to acquire and employ a weapons capability is more likely driven by its own internal logic and objectives. The U.S.S.R. would not be prompted to react to a U.S. ASAT program by suddenly developing its own ASAT program. It would develop its own ASAT program as a means to support its own military doctrine of attaining and maintaining space superiority.

2. The notion that the Soviets do not currently have a viable ASAT program is not true. The Soviet co-orbital ASAT program had gone through numerous refinements and upgrades from the 1960's to the 1980's. The ASAT platform has had a 64% success rate, and even though the Soviets had ceased all direct ASAT testing with a 1983 moratorium, they are certainly capable of refining and testing components in other, more benign systems that could be assembled together later to create the next generation Soviet ASAT weapon. Illustrative examples include the SL-11 booster, which is used in launching other space vehicles, as well as orbital docking exercises, which refine ASAT interception techniques. The co-orbital ASAT is also just one system. The Soviets are continuing to develop particle beam, laser, RF, and kinetic kill vehicles as a part of its strategic defense program. Thus, it is incorrect to believe a U.S. ASAT program would contribute to a Soviet ASAT arms race, when they have been, and continue to develop ASAT technology for years.

3. The Soviet Union does not ascribe to western-held beliefs that a nation's military force should be structured with an eye towards stability. It does not believe in the deterrence factor of mutual vulnerability, and instead is centered upon a damage-limiting posture. Even if this were the case however, it is difficult to see where the use of ASATs in a crisis could contribute to nuclear escalation unless one side's ASAT capability was robust enough to deny the enemy the ability to use its retaliatory nuclear force.
4. Finally, it is difficult to believe ASAT employment would destroy the capability of both the U.S. and U.S.S.R. to effectively command and control their respective forces and limit conflict escalation. While both nations have been increasing their utilization of space assets to increase their command and control capabilities, there remain useful and effective alternate means to communicate to either one's own forces, or to the enemy's senior command. Additionally, alternate means of observation (aircraft, and/or drones) could be used as an interim means of monitoring armistice compliance.

Mr. Berkowitz concludes by stating that the U.S. should not limit its development of an ASAT capability based upon the Instability argument because of the flawed assumptions listed above. Rather, the U.S. may well need to continue to pursue an ASAT program that may well be essential for the deterrence and prevention of war by holding Soviet force-enhancement satellites at risk.

In 2001, Col David Thompson, and LtCol. William Morris (USAF) published a consolidated work entitled "China in Space." The first paper, by LtCol Morris, examines

how the Chinese space effort fits into the overall national development strategy. LtCol Morris begins by briefly explaining China's National Development Strategy, and how the Chinese Space Program supports it. LtCol Morris' paper indicates that the Chinese Government has adopted a unique, "calculative" approach to achieving national security. China's space program has supported the national development strategy by capitalizing on the economic opportunities. This is illustrated in several ways – to include commercial satellite launches, job programs, educational programs, industry spin-offs and more. Technologically, China has continued to aggressively acquire information through a combination of joint space ventures, international agreements, technology transfers, and even espionage. All of these efforts are to allow China to seek to become a strong, modern and ultimately wealthy nation, or "great power".

The second paper, by Col Thompson, USAF, concentrates on China's military space programs and their current and near-term capabilities. Col Thompson notes that much of his work is speculative in nature due to the guarded nature of the Peoples Republic of China (PRC) military activities and developments. Much of what Col Thompson discusses is the physical aspects of the space program, and their possible military application. Col Thompson notes that the Chinese are developing new launch facilities; perfecting their telemetry and tracking capability; improving their command and control systems; developing intelligence surveillance and reconnaissance (ISR) satellites; and finally, a counter-space capability. Col Thompson also asserts that China's space strategy can be expected to support its national strategy. According to the FY2000 Secretary of Defense Report to Congress, the Chinese government's national security strategy is focused on becoming the preeminent power in East Asia. Col Thompson finds

that the above statement does not coincide with the November 2000 China State Council report on “China’s Space Activities.” This report is more benign in nature, and outlines a principal that is to peacefully develop and use space resources for the benefit of all mankind. Ultimately, Col Thompson sees the Chinese space strategy evolving remarkably similarly to the U.S. Like the U.S., China is hoping for the peaceful use of space, but is preparing for hostilities.

In 2003, Terence P. Jeffrey published an article entitled “The Next Pearl Harbor?” Mr. Jeffery briefly assesses the implications of the Chinese space program on U.S. national security. He examines the objectives of the Chinese space industry by recalling a segment of a speech given by Communist Party General Secretary Hu Jintao shortly before the launch of China’s first manned spaceflight in 2003. Mr. Jeffrey concludes Jintao’s reference to the “two bombs and one satellite spirit” (recalling China’s development of the atomic bomb, the hydrogen bomb, and its first satellite) is an illustration of the Chinese leadership’s firm connection of the civilian and military space programs.

Mr. Jeffrey then examines the threat China presents to the U.S. and their growing dependence on space assets. Mr. Jeffrey notes that China could conceivably preemptively attack U.S. space assets prior to the outbreak of a conflict in the Taiwan Strait, preventing effective U.S. military coordination. Mr. Jeffrey references comments from House Armed Services Chairman Duncan Hunter about the military threat of the Chinese space program. Rep. Hunter described a co-authored report he and Rep. Chris Cox produced studying the implications of U.S. technology transfers to China. Rep. Hunter remarks that some of the biggest U.S. companies gave information to the Chinese

missile program. By contributing engine technology to the Chinese launch vehicle program ostensibly for satellites, these companies enhanced the ballistic missile program as they utilize these same engines.

Finally, Mr. Jeffrey references the 2001 special commission on space-related national security issues, chaired by Donald Rumsfeld, which warns of a dramatic external event forcing resistant bureaucracies to take action. The report warns of a “space pearl harbor” event that will be the catalyst to move the U.S. to address the emerging Chinese threat.

In 2006, Ms. Stacey Solomone published an article entitled “China’s Space Program: the great leap upward.” Ms. Solomone is a Chinese language translator and is pursuing a Ph.D. in Futures Studies at the University of Hawaii. Ms. Solomone examines the Chinese space program and its military domination by the PLA. Ms. Solomone uses an extrapolative methodology to examine past and present factors within the organization of the Chinese space program, and presents a forecast of the most likely future of the program. Ms. Solomone begins by discussing a brief history of the Chinese space program, and how it was dominated by the military for much of its history. She then discusses the organization of the program in terms of hardware, orgware, and software.

In terms of hardware, Ms. Solomone discusses the tangible assets China has dedicated to their space program. She briefly lists the types of rockets that they have developed, as well as the launch facilities and tracking facilities they have constructed. Ms. Solomone then mentions the Chinese concept of skipping technologies in an effort to quickly close the technological gap with the west. She mentions the Chinese have been

trying to accomplish this through acquiring technology via bilateral endeavors with other nations, and other nefarious means like espionage.

For orgware, Ms. Solomone discusses the recent change in the Chinese space program's organizational structure. What had once been dominated by the military, the Chinese leadership has recently established the China National Space Administration (CNSA). While this and other organizational changes appear to civilianize and legitimize China's stated peaceful use of space, it remains unclear just how these changes supersede, or are subordinate to military space priorities.

In relation to software, Ms. Solomone is referring to the decision authority within the Chinese space program. Ms. Solomone points out that even with the addition of the CNSA, it is still unclear exactly who really controls the space program, and it appears that the military still has a large role to play. In support of PLA domination of the space program, Ms. Solomone refers to the words of Yang Liwei, China's first man in space, who was quoted as saying he would "gain honor for the people liberation army and for the Chinese Nation". Such a reference, she argues, points to the military role in the Chinese space program. Additionally, Ms. Solomone points to a lack of transparency in the decision process of the program. She also notes that many civilian Chinese space activities can have military applications as well.

Ms. Solomone concludes that the PLA will continue to dominate the Chinese space program, and most likely continue to pursue a means to employ space weapons. However, continued commercial development of the Chinese civilian space efforts may become more economically viable, and lead to a lessening of PLA influence, if China

feels the benefits of peaceful space use outweigh the threats posed by continued space weapons development.

In 2007, Dr. Desmond Ball posted an article entitled “Assessing China’s ASAT program.” Dr. Ball is a Special Professor in the Strategic and Defence Studies Centre at the Australian National University. Dr. Ball Discusses the Chinese ASAT test in January 2007, describing the technical means (i.e. the type of missile) used to conduct the ASAT operation.

Following the description of the ASAT test, Dr. Ball outlines the vulnerabilities current satellites have to attack. He points out that, the direct-ascent weapons used by China, are primarily threats to LEO satellites and thus China’s ASAT capability would threaten polar, LEO satellites such as Photographic imaging and Electronic intelligence satellites used by the U.S. Other systems that could be attacked by a direct-ascent ASAT weapon are satellites in Highly Elliptical Orbits (HEO). These systems could be within range of a Chinese ASAT weapon if their orbital perigee crosses Chinese territory. Dr. Ball also points out those satellites in higher orbits, such as Geostationary, communication, early warning, and navigation are more vulnerable to radio frequency and laser attacks.

Dr. Ball then briefly discusses other PRC ASAT programs. He points out that China is the third largest user of space for military purposes, and has a robust imagery and electronic intelligence satellite program. Dr. Ball also claims that China has a broad ASAT research program, spanning a variety of ASAT techniques. These techniques include radio-frequency (RF) jamming; ground based lasers, and possibly a parasitic micro-satellite “piggy-back” program. Dr. Ball discusses the militarization of space, and

the possible reasons for china to conduct such a test. Dr. Ball points out that many other countries besides the U.S. and Russia could be affected.

Finally, Dr. Ball illustrates that as countries such as the U.S. become increasingly reliant upon satellites to manage information superiority, they could see China's ASAT test as a threat to their space network. American satellites could be lucrative targets for the PLA in contingencies where the U.S. could be the principal enemy, such as the Taiwan Strait. China's ASAT test could also encourage regional powers to develop their own ASAT programs in response, particularly India.

Dr. Ball concludes by stating that the Chinese government has been an advocate for the prevention of an arms race in outer space in the past, yet by conducting this test, it has provided strong argument to embark upon a space arms race. Dr. Ball can only assume that the Chinese had calculated the inevitable reactions across the world on this test, and felt the risk was worth taking.

MAJ Morgan Dewitt published his thesis entitled "Space Power: A Critical Strength...and a Critical Vulnerability of the US Military" in 2007 as an academic work done at the Naval War College. This paper examines the threat posed by a potential adversary like China, that is capable of conducting counter-space operations, and seeks to determine if such threats expose a critical vulnerability in U.S. space operations.

MAJ Dewitt compares the use of precision guided munitions from Desert Storm, to their comparative use in Operation Iraqi Freedom (OIF). He concludes that the rise in the use of GPS-dependant munitions from 10% in Desert Storm, to 90% in OIF has created an over-reliance on space-based technology. He then utilizes examples of Iraq's counter-space operations in 2003 to illustrate how even a technologically inferior enemy

could conduct counter-space operations, primarily by jamming tactical unit links to satellites. This capability, added to efforts by nations like China, who are developing more sophisticated counter-space systems, pose a critical vulnerability to U.S. space operations. Because of the U.S. reliance on space technology, the loss of such capability could be extremely hazardous to U.S. forces.

MAJ Dewitt concludes his paper by stating that the threat to U.S. space platforms is very real, and the U.S. must incorporate the potential loss of such assets into operational planning, training, and exercises. Only by accounting for and developing contingency plans for the loss of space based assets, can the U.S. seek to immediately mitigate the effects of their operational loss and prepare their commanders for the “war in space” (Dewitt 2007, 1).

In 2007, Eric Hagt published an article entitled “China’s ASAT Test: Strategic Response.” This article is an attempt by the author to determine why China conducted its ASAT test after previously denying any such program existed. Hagt then attempts to reason what they could hope to gain by conducting this test.

Hagt begins by illustrating the lessons learned by the Chinese government shortly after Desert Storm. He reports that the Chinese derived key conclusions from the U.S. operations in Desert Storm. Notably, they are: 1) Space has a profound impact upon information in a high-tech war. 2) The U.S. military has developed almost complete dependence on space assets to conduct operations, 3) The U.S. is determined to dominate and control space. 4) This U.S. intent will lead to the inevitable weaponization of space, and 5) U.S. anti-ballistic missile employment threatens China’s nuclear deterrent capability. Hagt contends that all of these conclusions have led China’s leadership to

determine America's space weapons pose and intolerable risk to Chinese national security.

Hagt also attempts to reconcile the seemingly conflicting messages of the official Chinese policy on space, and the conduct of the ASAT test. Hagt notes that the 2006 Chinese White Paper stating the government's policy on space calls for the peaceful development of space, and a willingness to cooperate with others to achieve those goals. Hagt states that this goal of peaceful use of space is still paramount to Chinese aspirations, but also notes that the Shriever Wargame exercise conducted by the U.S. in 2001 was a clear indication to the Chinese that they were a primary target of the U.S. military space program. This exercise, coupled by the refusal of the U.S. to agree to the Prevention of an Arms Race in Outer Space (PAROS) treaty has convinced the Chinese that they have no alternative but to counter the U.S. threat.

Taken from this perspective, Hagt contends, "The principal driving force behind the decision to test the ASAT weapon was uncomplicated. It was a deliberate and strategic, but also defensive act. Facing the inevitability of space weaponization and the U.S. plans to dominate space, China voiced its opposition in a most strident way: that is, to demonstrate a deterrent capability." (Hagt 2007, 38)

After presenting a possible explanation as to why China conducted its ASAT test, Hagt attempts to reason why China is perhaps distorted in its view of U.S. space weaponization. He notes that the U.S. does not currently have any known space-borne weapons, nor are there any known plans within the U.S. military to develop and employ such weapons. However, the lack of strategic communication between the U.S. and China has created a culture of uncertainty between the two nations. China, while hoping

for a peaceful sharing of space, sees that it must prepare for possible weaponization of space.

To that end, Hagt suggests that the U.S. response to China's ASAT capability could be just as important as the test itself to China. If the U.S. were to continue to follow a path of distrust, then the possibility exists of a space arms race. If the U.S. were to take a more diplomatic approach, and engage the Chinese on the issue of space as partners, the U.S. might be able to convince the Chinese that there is no American "hegemony" of space. To do this however, would require several positive efforts on the part of the U.S., such as renewing a push for a space-weapons ban treaty, and conducting bi-lateral space ventures with China.

Shortly after the Chinese ASAT test in January 2007, Ms. Shirley Kan, researcher for the Congressional Research Service, published a report entitled "China's Anti-Satellite Weapon Test." Ms. Kan is a Specialist in National Security Policy, Foreign Affairs, Defense, and Trade Division.

This report details the ASAT test conducted by China on January 11th, 2007. Ms. Kan details the Chinese utilized a medium-range ballistic missile to destroy the Fengyun-1C weather satellite at approximately 530 miles up in LEO. She then states that in spite of protests from many countries (including the U.S.), the Chinese did not issue a public statement until 23 January, where they re-iterated China's call for the peaceful use of space and that the test was not aimed at any country.

Ms. Kan then illustrates possible security implications of the ASAT test. She notes that the amount of space debris generated by the test will present a significant threat to 700 LEO satellites for the next 20 years. She also notes how this is in seeming

violation of China's 2006 White Paper, which called for increased participation in space debris research and control. Apart from space debris, the ability of China to attack U.S. LEO satellites poses a threat to intelligence and military operations. While noting that China most likely does not possess enough interceptors, by 2010 it could produce enough of them to destroy most U.S. satellites in LEO with little warning.

In addition to technical capability, Ms. Kan discusses China's intentions. She refers to General Pace, who reported after a March visit to China, that the intention of their ASAT test remains unclear. China has not officially explained how it intends to use its ASAT weapon, but Ms. Kan points out that various comments from PRC officials and civilian analysts indicate that the test was a response to perceived U.S. hegemony in space. She notes that a PRC specialist at Fudan University indicated that China's ASAT program is developed partly to maintain China's nuclear deterrence, perceived as undermined by U.S. space assets. Another analyst at the PLA's Academy of Military Science argued that China does not have a clear space deterrence theory and that China likely seeks limited capability to counter U.S. dominance in space and reduce the likelihood of U.S. attacks against space assets.

Ms. Kan addresses the question of the ASAT test being a surprise to U.S. intelligence. She concludes that while the U.S. intelligence agencies did not have confirmation of an operational ASAT program, they knew China was actively developing an ASAT capability. Ms. Kan then explores the potential reasoning for the delay the Chinese government had in giving the official statement about the ASAT test. Ultimately, the reason for the 12 day delay is unknown, but analysis of the Chinese space

program's organization makes it unlikely that the test was not conducted without General-Secretary Hu Jintao's approval.

Ms. Kan then asks if China was signaling potential offensive military actions. She explores the possibility that the ASAT test was a demonstration of Chinese space capability, and a warning to the U.S. to not intervene on behalf of Taiwan should a conflict erupt between Taiwan and China. Another possible motivation presented by Ms. Kan is the ASAT test was a response to the 2006 U.S. National Space Policy, and the subsequent U.S. refusal to endorse Chinese efforts to ban space weapons. This apparent signal to prompt the U.S. to arms control negotiations is seen as unlikely however, due to the illogical Chinese method of conducting an ASAT test. By conducting the ASAT test, and not announcing it beforehand, the Chinese effectively eliminated its use as a "negotiating chip" for any arms control talks.

Finally, Ms. Kan discusses U.S. policy options to respond to the Chinese ASAT program. She notes that the Chinese ASAT test did not violate any existing arms control treaties, but did break a voluntary moratorium since the 1980s on such destruction of a satellite. She suggests a middle-ground view such as a narrowly targeted ban on kinetic ASAT weapons that create space debris. Overall, Ms. Kan points to several initiatives, both military and commercial, that are actively engaging China on a multitude of issues. All of these initiatives could be affected by this ASAT test.

In 2007, the Office of the Secretary of Defense (OSD) issued its annual report entitled "The Annual Report to Congress: Military Power of the People's Republic of China." This report details the activities of the Chinese strategic and military activity over the year, and notes possible areas of U.S. national interest concern. Notable to this

paper, is the Chinese anti-satellite (ASAT) test on 11 January 2007; the modernization of their strategic strike capabilities (both conventional and nuclear), and the overall transformation of their military. This report states that China has continued to rise rapidly as a regional political and economic power, but uncertainty surrounds the future course China's leader will set for their country.

The transformation of the Peoples Liberation Army (PLA) from a mass army designed for protracted wars of attrition on its territory to one capable of fighting and winning short-duration, high-intensity conflicts against high-tech adversaries is the focus of this report. The report contends that China's current force projection power is limited, but as stated in the 2006 Quadrennial Defense Review Report, it "has the greatest potential to compete militarily with the United States and field disruptive military technologies that could over time offset traditional U.S. military advantages." This also includes the realm of space.

The report details the depth of China's counter-space program as evidenced by their successful ASAT test. The report concludes that China's counter-space program poses dangers to human space flight and puts at risk the assets of all space faring nations. China's continued pursuit of area denial and anti-access strategies is expanding from the traditional land, air, and sea dimensions of the modern battlefield to include space and cyberspace.

In 2007, Phillip Saunders and Charles Lutes published a summary of a roundtable discussion held at the National Defense University. This report, entitled "China's ASAT Test: Motivations and Implications," attempts to discuss the reasons for, and implications of China's 2007 ASAT test. The report discusses motivations by concluding that the

Chinese ASAT test appears to be part of a larger effort to develop a range of ASAT capabilities, including ground-based lasers and jammers. This panel also concludes that the Chinese Leadership almost certainly approved of the test, but their clumsy handling of international questions afterward suggest a lack of internal coordination, perhaps due to security compartmentalization.

The report then discusses the implications of the ASAT test, stating that the Chinese ASAT could threaten U.S. satellites in low earth orbit, and future potential Chinese ASAT capabilities could pose a risk to higher orbiting U.S. satellites such as the Global Positioning System. Loss of these assets could effect U.S. military operations, particularly a military response to a Taiwan Strait contingency.

The report recommends that U.S. officials consider diplomatic initiatives to convince the Chinese to limit further ASAT development. The report states that no single option will be easy, as the U.S. must balance its broader relationship with China against the need to maintain space for both military and commercial purposes. The report then concludes by stating that a space arms race with China will complicate efforts to build a stable bilateral relationship.

In 2008, Kenneth S. Blazejewski published an article entitled “Space Weaponization and US-China Relations.” Mr. Blazejewski is in private practice in New York City. He received his master’s degree in public affairs from the Woodrow Wilson School ant Princeton University, and his JD degree from New York University School of Law. Mr. Blazejewski discusses the diplomatic and security challenges related to the weaponization of outer space. He also relates how both the U.S. and China’s continued

development of space weapons will lead to a possible arms race in both the space and nuclear missile realms.

Initially, Mr. Blazejewski illustrates the U.S. position on space weaponization. He points out that the U.S. policy on space weaponization is contradictory and unclear. While the U.S. government formally states that has no intention to weaponize outer space, the current space policies would seem to indicate the U.S. reserves the right to retain its freedom to maneuver in space, and deny any adversary the use of space should that adversary's space actions constitute a threat to U.S. national security.

Mr. Blazejewski illustrates the U.S. space policy problem through the U.S. reluctance to participate in the UN Conference on Disarmament (CD). The U.S. has refused to participate in negotiations on the Prevention of an Arms Race in Outer Space (PAROS), a program that China has politically endorsed, along with Russia, to ban all space weapons. U.S. contentions with the PAROS treaty fall within two issues; 1) there are currently no weapons in space, therefore a space weapons ban is not necessary, and 2) There is an inherent inability to accurately define the term: *space weapon*. While the U.S. continues to assure other nations that it will not weaponize space, its reluctance to formalize such a policy in an international agreement gives other nations, like China, cause to believe that the U.S. seeks to retain control of space.

Mr. Blazejewski then considers the Chinese view on space weaponization. China has also been giving mixed signals about space weaponization by its recent actions. While the PRC was a major proponent of the PAROS treaty, they still conducted an ASAT test in January, 2007. Mr. Blazjewski offers 4 interpretations about China's motivations for conducting their ASAT test:

1. China's ASAT capability is centered upon deterrence. Much like its nuclear arsenal, which is comparatively small, compared to the U.S. and Russia, the Chinese ASAT test is minimalist in nature. The Chinese government wishes to direct state resources to the development of industrial, economic, and conventional military assets, and will only develop nuclear and space weapons programs enough to deter other nations from attacking it.
2. China's ASAT program is a response to the belief that the U.S. seeks to control space. As China continues to become more reliant upon space based assets for both commercial and military purposes, it has a fear that the U.S. will seek to deny such capabilities to them. Therefore, China's ASAT test is a demonstration to America that it will not tolerate any U.S. attempt to deny its use of space.
3. China's statements at the CD on PAROS are simply rhetoric designed to buy time for China by restricting U.S. development of ASAT capability, while they attempt to close the technology gap. The Chinese ASAT test was but the first piece of a broad and comprehensive program designed to develop a wide variety of counterspace capabilities.
4. Finally, the contradictory nature of the Chinese avocation of PAROS and their ASAT test are not the result of a coordinated policy, but the result of "stove piped" organizations with little to no coordinating between them. Thus, the PAROS agreement was a project of the Ministry of Foreign Affairs, and the ASAT

test was a project of the PLA. Both initiatives were carried out without sufficient oversight, leading to events that sent mixed signals.

Mr. Blazejewski then proceeds to offer suggestions as to changes that should be made to U.S. policy and how to engage China in an effort to reduce space-related tensions between the two countries. In this regard, Mr. Blazejewski suggests the U.S. should engage China in three categories:

1. Space Based Weapons. Mr. Blazejewski suggests that rather than avoiding negotiations on banning space weapons, the U.S. should take an active role in them. By engaging China and other space faring nations on space weapons, the U.S. could elicit concessions from China on other issues. By pledging to ban space weapons, the U.S. could pressure China on nuclear fissile materiel proliferation, and demand greater transparency in their military planning process to reduce the likelihood of potential conflicts borne of ignorance to Chinese intentions.
2. Ballistic Missile Defense. Mr. Blazjewski then suggests that the U.S. could clarify the difference between space weapons, and BMD. By limiting BMDs to ground based defenses only, and assuring China it is not seeking to negate their nuclear deterrence, then it would alleviate China's fears of a dual use BMD system that could also be a space weapon platform, or a first strike weapon.
3. Ground based Antisatellite weapons. Mr. Blazejewski suggests that the U.S. pursue a two-track method of "hardening" its current satellites (thus making them more resistant to attack),

and banning the testing of ASAT weapons. Making the case that banning the development of ASAT related technology would be all but impossible to verify, the actual testing of ASAT systems are easily verifiable by the international community.

Therefore, the U.S. should seek to obtain an agreement with China to ban inherently destabilizing weapons such as ASAT, while continuing to pursue its right to a ballistic missile defense. Only through continued political engagement with China, will the U.S. be able to avoid a possible space weapons arms race.

CHAPTER 3

RESEARCH METHODOLOGY

Methodology

This paper will utilize a case study methodology. Case Studies are an analysis of a single instance of a class of events. By analyzing an instance of a class of events, one can determine the various elements that contributed to the results of the instance. An in-depth analysis of certain key elements across several similar cases could reveal a commonality. These elements may indeed be necessary for any such similar event, and therefore the presence of such elements could be powerful indicators that a similar event will occur in the future. Specifically, this paper will utilize the case study method to determine if China is trying to challenge the U.S. freedom of maneuver in space, and ultimately seeks to achieve space superiority.

To address the thesis question, this research will examine the space programs of both the United States, and the former Union of Soviet Socialist Republics (USSR) during both nation's space race era of the 1950's to the 1980's. During the years immediately following World War II, both nations embarked upon a fiercely intensive competition to master space. During this space race, both nations were committed to various lines of operations aimed at achieving space superiority.

For purpose of this research, this author will categorize and define these lines of operation as follows:

- Vision. The nation's "picture" of how it defines its success in the space arena.

- Doctrine. The nation's published written statements on the rights and use of space.
- Technology. The nation's technical capabilities, including space weapons systems.
- Organization. The nation's space program organizational structure, to include the decision making process.
- Resources. The financial resources that a nation commits to its space program.
- National Power. The political and military actions that a nation conducts to support its space program.

SPACE SUPERIORITY LINES OF OPERATION

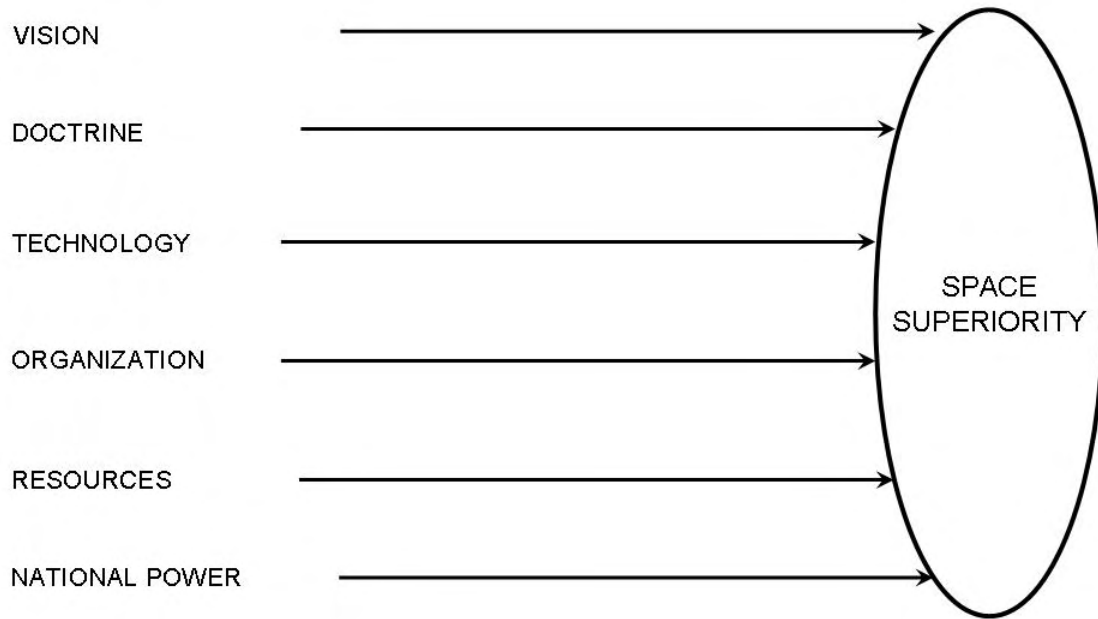


Figure 1. Lines of Operation Illustration

This paper will examine these lines of operation for both nations as outlined in figure 1. By examining both the US and USSR's space programs along these lines of operation, this research seeks to identify key events and decision points along them. By identifying key events and decisions and comparing them to each other, this research seeks to identify common elements to a space superiority strategy. An example is illustrated below:

PRC SPACE SUPERIORITY LINES OF OPERATION

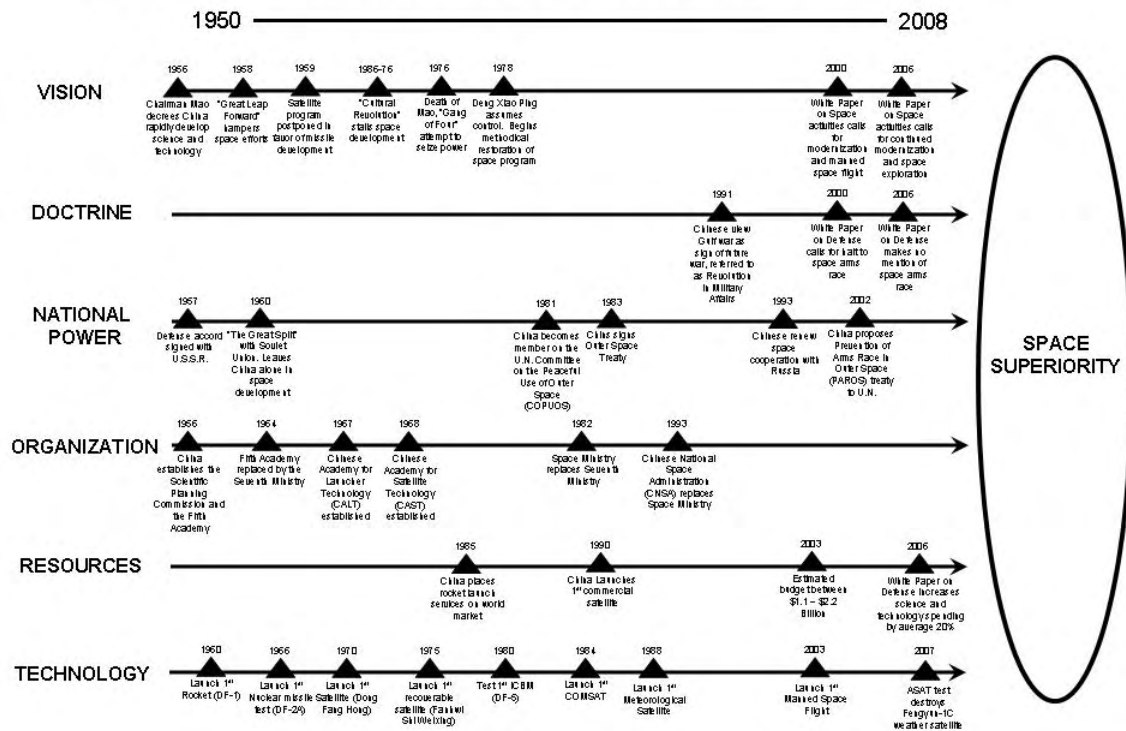


Figure 2. Key Events and Decision Points Illustration

This paper will then compare these common elements to China's current space program, and through extrapolation determine if their current space activities indicate a space superiority strategy that includes challenging the U.S. freedom to maneuver in space.

Strengths and Weaknesses

Case Study Methodology is qualitative in nature, and relies on congruence. Given similarities in key elements, this research can identify indicators that, if exhibited by China, would lead one to believe they were pursuing a space superiority strategy, but there is no way to reduce this to a formula that will ensure the exact same result every

time. Far too many factors that may play into the socio-economic spectrum affect the results.

The largest limitation of this research is the number of case studies available. Ideally, the more cases one can research, the more thorough the common elements would be. In this line of research however, there are only two nations in history who have had the resources to pursue a space program of the kind China is now embarking on, the US and USSR. As these two nations are the only real case studies available, it does limit research analysis.

Conversely, the analysis of both the US and USSR are excellent models for case studies. Both of these nations are very different in their culture, economic, political and social structures. Due to the extreme differences, any common key elements between them give strength to the assumption that these common key elements must exist in any space superiority strategy.

As previously stated, this paper will try to answer the question of whether China seeks to challenge US freedom of maneuver in space. By conducting case studies on both the US and USSR during their struggle to master space, this author seeks to identify common elements in a space superiority strategy. In so doing, this author will provide the indicators to identify in China's current space activities that would illustrate a similar space superiority strategy. By comparing these indicators, this paper seeks through congruence, to determine if China's space activities now, will lead to space superiority in the future.

CHAPTER 4

ANALYSIS

Findings of the U.S. and Soviet Space Program Lines of Effort

U.S. Vision

Vision defined in this context refers to a nation's definition of success in the space arena. Historically, these visions have been conveyed in the U.S. by way of the President and his closest advisors as they address the public about the future of the U.S. space program. These public speeches have set the tone of a presidential administration, and give insight as to what aspects of space are considered vital to national security. These directives also form the basis for space doctrine.

The U.S. has pursued an active ASAT program since the 1950s and proceeds to the present day (Grego 2008, 1). The ASAT program had its genesis in the first use of satellites as surveillance vehicles over the former Soviet Union. They were a natural progression to spy plane operations, and much less risky. Due to the relative impunity with which satellites could view the Soviet Union, the U.S. realized that if Russia had a similar capability, they would possess no defense.

The origins of the U.S. space program began in the closing days of World War II. As the U.S. began to study the German rocket V-2 program, it became increasingly obvious that space would play an important role in the next war. In addition to rocket technology allowing for long-range strike capability from missiles, the military utility of creating and deploying orbiting satellites was noted in a 1946-RAND report commissioned by then General of the Army Air Forces, Curtis LeMay. (Stares 1985, 25) The report makes mention of the satellite utility for observation missions by stating the

“satellite offers an observation aircraft which cannot be brought down by an enemy who has not mastered similar techniques.” (Stares 1985, 26) Since the U.S.S.R. continued to remain closed to most observation, the reconnaissance capability of satellites became increasingly attractive to the U.S.

Towards the end of the Eisenhower administration, the development and deployment of reconnaissance satellites had begun to provide good intelligence on the Soviet Union. This allowed Eisenhower to cease the controversial and vulnerable U2 flights, which had become all but impossible after U2 pilot Gary Powers was shot down and captured by Soviet forces. Accordingly, senior US officials feared that the resultant U.S. dependency on reconnaissance satellites would create among the Soviet Union a powerful incentive to develop antisatellite weapons.

Therefore, should the U.S. and U.S.S.R. to begin to develop ASATs, the U.S. would stand to lose much more in terms of intelligence gathering assets than the Soviets. This situation presented the Eisenhower administration with the problem of how to preserve satellite reconnaissance without building space weapons to protect these assets.

It would only be a matter of time before the Soviets would challenge the legitimacy of reconnaissance satellites as an invasion of their sovereign territory, and the U.S. could do without the added encouragement of the United States taking the lead in ASAT development and deployment. (Stares 1985, 52)

To that end, Eisenhower sought to present a “peaceful” use of space in order to legitimize satellite reconnaissance. While many service proposals were presented to Eisenhower on space weaponry, his foremost concern was to avoid projecting an aggressive image to the Soviets, thus triggering them to produce countermeasures. This

vision of the peaceful use of space would lay the foundations for policy for many administrations to come. (Logsdon 1995, 345) When the Soviets resumed ASAT testing in 1976, renewed concern over the vulnerability of U.S. space assets led to a re-kindling of the U.S. ASAT program as one of the last authorizations before President Ford left office. (Stares 1985, 179)

As the Carter administration came to office, it inherited the renewed ASAT program decisions of the Ford administration. While Carter favored arms control negotiations, it made no effort to curb ASAT development as a means to bargain with the Soviets. This “two-track” policy became the basis for arms control negotiations with the Soviets throughout the Carter presidency. (Stares 1985, 200) Carter was also instrumental in expanding U.S. space doctrine to clarify the rights of the U.S. to defend its space assets from any aggressors.

Building upon President Carter’s vision, the Reagan administration accelerated the development of both ASAT and ABM space weaponry under the Strategic Defense Initiative. The Reagan administration seemed to entirely discount arms control negotiations in favor of a renewed development of space weapons. Indeed, Reagan’s “Start Wars” speech in 1983 seemed to illuminate the administration’s reliance upon superior U.S. technology to ensure national security rather than arms negotiations

Following the break-up of the Soviet Union, most military space development under the George H.W. Bush administration went towards enhancing terrestrial operations. New satellite communications, surveillance, and navigation systems were rapidly becoming operational. This vision of enhanced terrestrial capability was realized

in the 1991 Gulf War, when space assets became vital to the successful execution of air and ground operations in Iraq.

Since September 11th 2001, President George W. Bush has adopted a very protectionist vision for space. Influenced by the *Report of the Commission to Assess the United States National Security Space Management and Organization*, President Bush framed the current U.S. space policy based upon the national security assessment in this document. This document highlighted the notion that no other nation is as dependent upon space as the U.S., and yet there has been no serious national effort to evaluate the current space threats. The report also described the increasing threat of non-state actors, and their ability to utilize commercial technology to threaten U.S. Space assets. To combat these emerging threats, the report advocated for ASAT technology, stating: “The U.S. will require means of negating satellite threats, whether temporary and reversible or physically destructive” (U.S. Senate 2001, 75).

U.S.S.R. Vision

Soviet vision for a military space capability falls roughly within two categories separated by a single event. The single event, given more detail later is the signing of the *Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies*, also referred to as the Outer Space Treaty (U.S. Department of State 1967, 1).

The first category encompasses the time from the beginning of the Soviet space program to just before the signing of the Outer Space Treaty. During this time (1957-1966), the Soviet Union never publicly admitted it had a military program for space. Unofficially however, there were vague statements from high-level party members

indicating the Soviet intention to explore possibilities of defending the USSR from space borne attack, and to deny an opponent the ability to gain space superiority (U.S. Department of Defense 1984, 6). This view of developing superior weaponry to deter any aggressor was, an important part of the formulation of Soviet military strategy, and it only seemed natural to apply this thought to the space realm.

In the years following the signing of the Outer Space treaty, there was a marked difference in the rhetoric on military use of space from Moscow leaders. Soviet propaganda deemed it unacceptable for officials to refer to the need for a defense against space borne attack (U.S. Department of Defense 1984, 2). Only general statements, which did not specifically exclude defense against space attack, were permitted. Consequently, Moscow's leaders seemed to present an entirely benign viewpoint centered on the peaceful use of space for all. The Soviets made a concerted effort to portray to the world that it has consistently worked to present a legal framework to ensure the peaceful utilization of space.

The Soviet information campaign throughout the 1970's and 1980's was a consistent message of "always coming out for the benefit of mankind" (Hensel 1985, 14), while condemning the west (and the U.S. in particular) for continuing to pursue space weapons.

Conclusions on Vision

For the U.S. and U.S.S.R, visions of a space program often lagged behind technology. Early in their space programs, U.S. and Soviet leaders could not even contemplate the significance of space technology outside of strategic missile capability. As satellite capabilities began to bear practical fruits for both nations in surveillance and

communications roles, both the U.S. and Soviet leadership struggled to provide a clear vision to direct their respective space programs.

These assets became so valuable, that much of the space program visions centered on preserving the use of space, and defining the legal framework for space operations. To that end, U.S. leaders like Eisenhower, Kennedy and Johnson established a space program vision that espoused the “peaceful” use of space, and Soviet Premieres Brezhnev and Andropov did likewise. As space technology matured, it became so integral to the operation of national military and economic systems, that control of space became another necessity to ensure national security.

With the collapse of the Soviet Union, the U.S. military space vision focused upon enhancing conventional forces. The resulting enormous success of the 1991 Gulf War illustrated the ever-increasing importance of space assets in a conventional fight, and created even more dependence upon these systems.

After the terrorist attacks on September 11th 2001, the U.S. vision turned to protecting its valuable commercial and military space assets from not only traditional state enemies, but also possibly non-state actors. While these non-state actors could not pose a significant threat in a conventional attack, a non-conventional attack against even a few of the vulnerable U.S. space assets could cause serious economic and military disruption. Consequently, the U.S. exhibited renewed efforts to secure and protect its space assets.

U.S. Doctrine

Doctrine is defined as the official published guidance from the nation’s leaders on the priorities and direction its space program will undertake. It is a detailed document

outlining the way ahead for the space program, and includes factors of defense, civil aviation, organization and project priorities.

The Eisenhower administration published the first U.S. space doctrine in 1958 (Logsdon 1995, 345). Doctrinally caught unawares with the impact of Sputnik, the Eisenhower administration was almost forced by circumstances to respond with a doctrine that addressed the necessity of space to national security. As the military services and other U.S. leaders were calling for the development of space weapons, Eisenhower requested the Presidential Science Advisory Council (PSAC) recommend the outlines of a national space program. The result was the Purcell report, which endorsed much of Eisenhower's views on space exploitation.

The report's endorsement of passive military space systems and rejection of space weapons became the basis for U.S. military doctrine in space, and was outlined in a succession of NSC directives including NSC 5814/1 entitled "Preliminary U.S. Policy in Outer Space" (Stares 1985, 47). As noted in Eisenhower's vision, this policy highlighted the need to exploit the military use of space, but also to exercise restraint in the development of space weapons, in the belief that the Soviet Union would do likewise.

It was not until the closing days of the Ford administration, with renewed fears of a growing Soviet military space threat, that U.S. space doctrine received a change in tone. Shortly before leaving office, President Ford signed the National Security Decision Memorandum (NSDM) 345 directing DoD to develop an ASAT capability and explore options in regards to ASAT arms control (Stares 1985, 170-71).

As President Carter took office in 1977, the policies set forth by President Ford were expounded. The concept of utilizing the ASAT program as a bargaining tool in

engagements with the Soviets, as well continuing to develop an active ASAT program became known as the Two-track policy (Stares 1985, 180-83).

President Carter went further than any previous administration in the principles of national space policy. In Carter's Presidential Directive on National Space Policy (PDNSP) 37, Carter specified several key policy decisions that have been incorporated into every administration's space policy since. These enduring policy decisions included:

- a. "a rejection of any claims to sovereignty over outer space or over celestial bodies, or any portion thereof, and rejection of any limitations on the fundamental right to acquire data from space" (U.S. President 1978, 1)
- b. "The space systems of any nation are national property and have the right of passage through and operations in space without interference. Purposeful interference with operational space systems shall be viewed as an infringement upon sovereign rights" (U.S. President 1978, 2)
- c. "The United States will pursue activities in space in support of its right of self defense" (U.S. President 1978, 2)

By 1982, President Regan issued National Security Decision Directive (NSDD)-42. While re-emphasizing the principles of Carter's PDNSP-37, it went further in directing that, "The United States will oppose arms control concepts or legal regimes that seek general prohibitions on the military or intelligence use of space" (U.S. President

1982, 1). Therefore, the Reagan administration's emphasis on the U.S. right to retain its freedom of maneuver in space extended to international treaty as well.

By 1988, Reagan further defined ASAT capability by issuing the Presidential Directive on National Space Policy (PDNSP), which stated DoD would, "develop, operate, and maintain enduring space systems to ensure its freedom of action in space. This requires an integrated combination of antisatellite, survivability, and surveillance capabilities." As well as, "DoD will develop and deploy a robust and comprehensive ASAT capability with programs as required and with initial operational capability at the earliest possible date." (U.S. President 1988, 1). This was a different approach than the Carter administration in that the emphasis on deploying a credible ASAT capability would be part of an overall set of hardware that, combined with ballistic missile defense, would negate the Soviet threat and ensure space superiority.

The current policy is perhaps the most illustrative of the U.S. desire for space superiority. In addition to the previous principles issued by Carter and Reagan, the policy adds:

"The United States considers space capabilities – including the ground and space segments and supporting links – vital to its national interests. Consistent with this policy, the United States will: preserve its rights, capabilities and freedom of action in space; dissuade or deter others from either impeding those rights or developing capabilities intended to do so; take those actions necessary to protect its space capabilities; respond to interference; and deny, if necessary, adversaries the use of space capabilities hostile to U.S. national interests;" (2006, 1-2).

U.S. President, *National Space Policy*

U.S.S.R. Doctrine

Officially, the USSR maintains it has no military space program, and therefore, no doctrine to support the military use of space. This is most probably linked to the Soviet government's public stand on the peaceful use of space. Despite the fact there is no published Soviet Doctrine specifically on the military use of space, the Soviet program is not only overwhelmingly military in nature, but the civilian scientific and economic aspects of the program are subordinate to the military functions (U.S. Department of Defense 1984, 1). In support of this view are several references to space in notable works on Soviet military strategy.

The earliest reference to space in a soviet military text is the first edition of Marshal Sokolovsky's book *Military Strategy*. This text, which has undergone several revisions and updates since its 1962 debut, establishes Soviet Military Official views on the basic fundamental problems of war (U.S. Department of Defense 1984, 1). The first edition of Sokolovsky's *Military Strategy* book contained a subsection entitled "The Problems of Using Outer Space for Military Purposes" in this subsection; he describes the "aggressive military purposes" of imperialist forces, and their pursuit of "the mastery of space" (Sokolovsky 1963, 304). US satellite efforts in reconnaissance, navigation, and communications as well as plans for "satellite bombers," "orbital bombers," and "carrier-satellites (antisatellites) are cause for great concern for the USSR as Sokolovsky claims "a considerable part of the US program of the mastery of space for military purposes is the creation of anti-space weapons for the destruction of aerospace vehicles." In his

conclusion, Sokolovsky illustrates a need for the USSR to oppose the west in its endeavor to control space (Sokolovsky 1963, 305).

The further refinement of Soviet military space doctrine is also illustrated in the 1965 edition of the Soviet armed forces *Dictionary of Basic Military Terms*. This document categorically defined military terms for Soviet military leaders and was part of a series of books called the officer's library (United States Air Force 1965, v). The definition that bears pertinence to the Soviet military space program is on anti-space defense and states:

“A component part of air defense. The main purpose of anti-space defense is to destroy space systems used by the enemy for military purposes, in their orbits. The principal means of anti-space defense are special spacecraft and vehicles (e.g., satellite-interceptors), which may be controlled either from the ground or by special crews” (1965, 177).

United States Air Force, *Dictionary of Basic Military Terms*

This definition would seem to indicate an operational doctrine or mission had been adopted by the Soviet armed forces to meet this requirement (Stares 1985, 150).

Perhaps the most authoritative document is the *Soviet Military Encyclopedia* (U.S. Department of Defense 1984, 4) this eight -volume compendium written under direction of the Soviet General Staff may in fact be intended to replace Sokolovsky's *Military Strategy* as the definitive Soviet comment on military matters (U.S. Department of Defense 1984, 4). The SME provides many insights on the nature of Soviet doctrine, and how it applies to military forces. Of most concern to this paper are passages that deal with the primacy of the offensive and the uniformity of concepts of Soviet Military Doctrine in applications to all of the Armed forces. In the SME, the attack is the favored

military operation and seen as the means with which to achieve tactical, operational, and strategic success.

As a close follow-on, the SME further defines the application of this doctrine to all of the Soviet armed forces by stating, “Soviet military doctrine is uniform for all the Armed forces. This means that its concepts have identical importance both for the Soviet military structure as a whole and for each Service of the Armed Forces” (U.S. Department of Defense 1984, 5).

These two concepts clearly indicate the type of doctrine for a Soviet Military Space program. By referring to “each Service of the Armed Forces”, this includes both the Strategic Rocket Force, and the Air Defense Forces. Both of these Soviet Services are heavily involved in the Space program. By conclusion, while there is no official Soviet Military Space Doctrine, the SME directs the Soviet Military to use overwhelming force to defeat any enemy while protecting the homeland. It can be concluded that the scope of such military operations also include those space operations that support this (U.S. Department of Defense 1984, 6).

Conclusions on Doctrine

Both U.S. and Soviet doctrines have one overriding common theme: to recognize the vital importance of space-based capabilities, and ensure these capabilities are preserved. Consequently, they developed doctrine directing the development and employment of ASAT weapons. While the U.S.S.R. seemed to cease its ASAT program in 1983 (Hensel 1985, 20), it still arguably possessed an ASAT capability in terms of technological ability and operator knowledge right up until the break-up of the Soviet

Union. The U.S. pursued many ASAT programs, and still possesses a technological capability to quickly produce an ASAT weapon should the need arise.

Politically, these ASAT weapons have been characterized as both vanguards to the enemy's aggressive space activities; and examples of an out-of-control arms race, that now extends to space. Doctrinally, ASAT weapons were another piece of the military's arsenal designed to do its part in fighting and winning the nation's wars. With the emerging dependence on space assets in both the U.S.S.R. and the U.S., it became apparent to both nations that the loss of these space assets could prove extremely difficult to overcome in a future war. To that end, both nations sought ways to protect their space assets.

The U.S. issued doctrine that defined the importance of space control to the military to guide the employment of ASAT weapons. Beginning with President Carter's NSC-37 directive, the U.S. began to assert that an attack on a U.S. satellite was akin to an attack on U.S. territory. The U.S. equated an attack on its space assets as an act of war, and thus cleared the nation to respond to such an attack appropriately. This was further expanded in succeeding administrations up until the present U.S. space doctrine, which included the assertion that the U.S. has the right to deny an enemy the use of space entirely.

While Soviet vision is for the peaceful use of space, Soviet military doctrine openly advocated the attack, and stated that this doctrine applied to all aspects of the Soviet armed forces. This included space and missile forces in the Soviet Air Defense command.

U.S. National Power

National Power as defined in this paper refers to those diplomatic efforts a nation engages in to support its space program.

The Eisenhower administration set the tone for many of the international endeavors of the U.S. State Department. The quandary of the Eisenhower administration was to preserve its growing surveillance satellite capability without leading to a space arms race. In order to address this problem, the Eisenhower administration chose to seek “what can be described as a politico-legal solution to the vulnerability of US reconnaissance satellites” (Stares 1985, 54). Consequently, the administration set about proposing a series “of international agreements to sanction or legitimize those military activities in outer space that were considered beneficial to the United States and outlaw those that were not” (Stares 1985, 54). This effort was vehemently opposed by the Soviet Union, who regarded the over flights of American satellites to be violations of its airspace.

Members of President Kennedy’s National Security Action Memorandum 156 Committee drafted a response to the Soviet objections to reconnaissance satellites. The response to the First Committee of the United Nations in 1962 included the key statement:

“It is the view of the United States that Outer Space should be used for peaceful – that is, non-aggressive and beneficial – purposes. The question of military activities in space cannot be divorced from the question of military activities on earth. There is, in any event, no workable dividing line between military and non-military uses of space. One of the consequences of these factors is that any nation may use satellites for such purposes as observation and information gathering. Observation from space is consistent with international law, just as observation from the high seas” (1985, 70-71).

Stares, *Militarization of Space*

While the Soviets never openly dropped their objections to satellite reconnaissance, the development of their own successful satellite reconnaissance systems seemed to be the reason that they ceased addressing the subject. With the removal of Soviet objections, the U.N. voted to apply space law in a similar manner as maritime law, thus legally allowing the use of surveillance from space.

At about the same time, there was contention in the Kennedy administration on the endorsement of a proposal to ban nuclear weapons in space. Concern over using satellites as a national means of verifying compliance with such a treaty would entail the U.S. publicly revealing the capabilities of its reconnaissance satellites. This debate was battled around Washington until William Foster, of the Arms Control and Disarmament Agency (ACDA) wrote to President Kennedy in favor of a ban on weapons of mass destruction in space. In the memorandum, he stated:

“ACDA believes that if an agreement could be reached to prohibit the placing in orbit of weapons of mass destruction, such an agreement would be in the interest of national security. To prevent the extension of the arms race to outer space should be an important objective of arms control, and hence national security policy. This conclusion appears valid even if such an agreement were fully effective only against very large and hence very high yield weapons such as those tested by the Soviet Union in its latest test series. The fact that the Soviet Union would gain increased knowledge of our satellite reconnaissance capabilities does not seem a compelling argument against our acceptance of inspection procedures particularly in view of the present Soviet ability to estimate these capabilities with a substantial degree of accuracy, a fact that is noted in the Satellite Reconnaissance Report” (1985, 83).

Stares, *Militarization of Space*

Essentially, the U.S. came to the realization that the benefits of using satellites for treaty verification far outweighed concerns for revealing satellite capabilities, which the Soviets had already assessed accurately anyway. As such, the U.S. would not lose anything by promoting the treaty. Now that a legal status had been established the use of space, it paved the way for the 1967 Outer Space Treaty. This treaty was another national effort to keep both the U.S.S.R. and the U.S. from placing weapons of mass destruction on satellites (U.S. Department of State 1967).

U.S.S.R. National Power

Soviet political culture from post World War II into the 1950's was marked by the absolute isolationism that was exhibited by Soviet leadership. One of the most pervasive characteristics of Soviet society then was state secrecy (Stares 1985, 147). This obsession with the security of its own borders caused the U.S.S.R. to begin a diplomatic effort against U.S. satellite reconnaissance. Initially, the Soviets submitted a draft proposal to the U.N. legal subcommittee in 1962 that stated:

“The use of artificial satellites for the collection of intelligence information in the territory of foreign states is incompatible with the objectives of mankind in its conquest of outer space” (2008, 7).

Grego, *A History of Anti-Satellite Systems*

This proposal was seriously debated and gave rise to concerns about territorial sovereignty and to what extent it expanded into space. However, when it became apparent that the Soviet reconnaissance satellite program was beginning to yield valuable intelligence, they simply ceased to protest satellite reconnaissance (Stares 1985, 71).

Additionally, the Soviets found satellites were an effective alternative to on-site inspections for ensuring treaty compliance.

With the tacit approval reconnaissance satellites, the next major expression of national power was the signing of the Outer Space Treaty in 1967. This treaty fundamentally changed the official Soviet statements about the military use of space. Subsequent to ratifying this treaty, the Soviets created an aura of benevolent intentions on the peaceful use of space. This was given voice in a continual information campaign by the Soviet media to convince the world that the Soviet space program was entirely benevolent, while the U.S. continued to pursue space weapons. This treaty gave much in the way of diplomatic “ammunition” to openly criticize the U.S. space program on every aspect of its projects, from satellite production to the Space Shuttle; everything was open to Soviet criticism of weaponizing space.

This Soviet information tactic was particularly pronounced in 1983 when President Reagan announced plans to conduct the Strategic Defense Initiative (SDI), an American defensive system designed to intercept incoming nuclear missiles from space. Following this announcement, the Soviet media greatly intensified the volume of accusations that the SDI program violated several already agreed upon treaties, to include the 1967 Outer Space Treaty, and the 1972 Anti-Ballistic Missile (ABM) treaty. The focus of this intense Soviet media campaign was to portray the U.S. as a unilateral violator of international treaties, and subsequently depict the U.S.S.R. as scrupulously adhering to these treaties (Hensel 1985, 18).

Following the SDI announcement, the U.S.S.R. appeared to adopt a “two-track” approach to the future of space weapons. On the one hand, Soviet leaders continued to

make it known that the U.S.S.R. would be prepared to respond in kind if the U.S. continued to pursue arms in space (Hensel 1985, 18). Conversely, the Soviet media consistently maintained that the U.S.S.R. preferred some sort of international agreement that would ban all weapons from space (Hensel 1985, 18).

In response to the SDI program, the Soviet Union pursued an even more intensive campaign to ban all space weapons. In 1981, Soviet foreign minister Gromyko submitted a draft treaty to the U.N. General Assembly calling for the complete ban on all space weapons, including ASAT (Hensel 1985, 19). This call for arms control reached a climax in 1983 when Soviet Premier Andropov announced a moratorium on all ASAT deployment. In addition to a unilateral moratorium on ASAT testing, the 1983 treaty proposal went through great lengths to clarify the banning of space weapons. This draft treaty included calls to ban the use of force in space; a ban on the testing and deployment of any space based weapon intended to hit targets on the Earth, in the atmosphere, or in space; the testing and development of new antisatellite systems; the elimination of such systems already in their possession; and the testing and use for military, including antisatellite purposes, any manned spacecraft (Hensel 1985, 21).

Soviet media touted Foreign Minister Gromyko's treaty proposal as a "voice of reason and the manifestation of the U.S.S.R.'s firm resolve to make progress in all directions in restraining the arms race and averting nuclear war" (Hensel 1985, 22). Indeed, the Soviet proposal did receive widespread support from both the international and some U.S. domestic activist groups (Stares 1985, 232).

Overall, the Soviet initiatives for arms control were a robust information campaign designed to increase world prestige, and gather international condemnation of U.S. ASAT efforts.

Conclusions on National Power

Early in the history of the U.S. space program both the Eisenhower and Kennedy administrations sought to get the world community to legally define “space”, as well as establish a legal framework for the operation of space assets. All of these efforts were an attempt to get the world community to legalize the employment of reconnaissance satellites. At that time, space technology was limited, and the idea of fighting a “space war” was more in the realm of science fiction rather than science fact. Still, Eisenhower and Kennedy realized that to embark upon an uncontrolled space arms race with the Soviets might very well escalate hostilities that could eventually lead to open war.

Both the U.S. and U.S.S.R. embarked upon campaigns to set international legal parameters to the use of space in an effort to curb this space arms race. In the case of the U.S., the goal of the Kennedy administration was to advocate the peaceful use of space, but retain the freedom to use reconnaissance satellites. The U.S. called for a legal framework similar to maritime law, where space was legally the same as international waters. A legal precedent had already been set allowing surveillance from international waters.

The “international waters” definition of space was initially opposed by the Soviet Union, primarily because they held the belief that a nation’s airspace was sovereign, then so too should this right be extended to space. Secondly, the Soviets were already well aware of the U.S. “spy satellites” brazenly flying over their territory, and rather than try

to shoot them down and possibly escalate a space war, they chose to pursue an international diplomatic campaign to make their use illegal.

Surprisingly enough, related arms negotiations diffused the reconnaissance satellite issue. As both the U.S. and U.S.S.R. wrestled with details over the Partial Test Ban treaty, one of the major obstacles was the issue of verification. Since neither side trusted the other to refrain from conducting nuclear tests, there was a requirement for monitoring nuclear activities. As satellite technology matured, it provided the capability to monitor nuclear explosions from space on a continual basis. With the utility of treaty verification added to the reconnaissance satellite role, it gained the legitimacy sought by the U.S. Even the Soviets could no longer argue against this utility since they were reliant upon the same method for verification.

U.S. Organization

Organization as defined in this paper refers to the organizational structure of a nation's space program. Examination of a nation's space program organization provides indicators of not only depth and breadth of a nation's commitment to its space program, but its decision process as well.

The early days of the U.S. space program were characterized by disorganization and duplication of effort. The Eisenhower administration attempted to organize all space activities under one umbrella with the National Aeronautics and Space Act of 1958, which stated that space activities:

“shall be the responsibility of, and shall be directed by, a civilian agency...except the activities peculiar to or primarily associated with the development of weapon systems, military operations, or the defense of the United States (including

research and development...) shall be the responsibility of, and shall be directed by, the Department of Defense” (1985, 42).

Stares, *Militarization of Space*

While succeeding in developing a consolidated civilian space organization, the armed services continued to develop their own space projects, including ASAT programs, in virtual solitude. They continued to present duplicate efforts in many space programs during the Kennedy administration, even resulting in two operational ASAT programs at the same time. In an effort to curb runaway space project within the armed services, the Kennedy administration in 1962 issued Department of Defense directive 5160.32, which nominally made the Air Force the lead Department of Defense space agency. While this directive made the Air Force the primary service in military space research and development, it did not make them the sole service as the Army and Navy were still allowed to conduct research and engineering development projects (Stares 1985, 61).

Additionally, the National Reconnaissance Office (NRO) was established in 1960 to assist both the Department of Defense and the Central Intelligence Agency (CIA) in the procurement and operation of surveillance satellites. It was not until 1985 that a unified space command was established to coordinate and prioritize U.S. military space efforts and operations.

U.S.S.R. Organization

Detailed information on the organization of the Soviet space program is difficult to determine due to the secretive nature of the program. However, unclassified U.S. intelligence sources provide an estimate of this nebulous organization.

The primary decision making body was estimated to be the Politburo, and specifically those members who formed the Defense Council (U.S. Department of Defense 1984, 25). The exact relationship between the Politburo, and the Defense Council could be presumed to be one of general control and prioritization (U.S. Department of Defense 1984, 26).

Below the Politburo was the Council of Ministers that contained a decision making body charged with implementing party policy (U.S. Department of Defense 1984, 26). This Council exercised control at all levels of the space program, and oversaw several entities that were military in nature including The Ministry of Defense, Ministry of Defense Industries, and the Military Industrial Commission (U.S. Senate 1989, 505). The Ministry of Defense consists of ranking military officers throughout the organization and coordinates the military role in the space program. They maintain a strong influence over the Defense Industry, particularly the strategic Industries that manufacture space systems. Below the Ministry of Defense are the General Staffs for all of the Soviet Military Services (Army, Navy, Air Force, Air Defense Forces, and the Strategic Rocket Program). All of the branch commands have influence over the Soviet space program, but The Strategic Rocket Force and the Air Force have direct operational roles. The Strategic Rocket Force is responsible for the direct launch missions of the space program, while the Air Force trains cosmonauts, and conducts launch vehicle recovery missions (U.S. Senate 1989, 510).

Throughout its inception to the 1990's the Soviet Space Program was dominated by the military. It was not until Premier Gorbachev created Glavkosmos, a civilian agency nominally to prioritize and coordinate space projects in 1986, that the civilian

space sector played any major decision-making role within the Soviet Space Program (U.S. Senate 1989, 511).

Conclusions on Organization

The United States in the genesis of its space program quickly realized the need to legitimize the development of space along both secretive military projects, and publicly promoted science and technology projects. Public space science projects were necessary to achieve international prestige, legitimize space activities, and most importantly, retain national public support for the conquest of space. Military space projects, with their emphasis on surveillance and communications, were necessary for military enhancement and the achievement of national security.

The U.S. created two distinct agencies in charge of space activities. NASA, a civilian organization is responsible for all U.S. space activities except military projects, which still fell under the Department of Defense.

The NASA/DoD space organization, while designed to delineate civilian and military space activities, created several problems with an extended decision cycle, competition for resources, and duplicated efforts. The DoD was somewhat at a disadvantage because many of its space projects were classified, and therefore could not compete with the more grandiose projects of NASA.

Conversely, the Soviet space program was fundamentally secretive, centralized, and dominated by the military. Because of their abbreviated decision process and secretive nature, the Soviet space program was able to execute space projects much quicker than its U.S. counterpart was. Additionally, since the Soviet system was fundamentally closed to public scrutiny, there was no need for Politburo leadership to

justify the expense of space activities to the people. Decisions were made quickly, and executed rapidly. This in effect allowed the Soviet Union to rapidly conduct early space missions with lower technology than the U.S., giving the appearance that the U.S. was lagging behind the Soviets technologically.

U.S. Resources

Resources as defined in this paper refer to the amount of economic investment a nation has placed in its space program.

The U.S. Department of Defense space program budget was initially very modest, with a slow, deliberate expenditure of minor missile and satellite development studies being conducted prior to 1958. The Soviet launching of Sputnik however, quickly placed national emphasis on the space program. During the 1950's and 1960's, the bulk of the Defense Department's budget was centered upon development of Intercontinental Ballistic Missiles (ICBMs) and Intermediate Range Ballistic Missiles (IRBMs) and rightly so as these were the primary means of strategic deterrence with the Soviet Union.

While funded, the various ASAT programs within the armed services were constantly under the threat of being cut from the next administration's budget. In spite of this, ASAT development continued in one form or another throughout the 1960's through the 1970's. With the inauguration of the Reagan administration, the defense department as a whole received an enormous increase in its funding. The space program was not different and it was during this time that projects for ASAT, SDI and ABM development were authorized.

With the break-up of the Soviet Union in the 1990's, the defense department's space budget was once again reduced as the perceived threat level had diminished. It has

only been in the last few years that the Defense Department space program has seen any significant budget increases. The following is an excerpt from the Aeronautics and Space Report to the President, which details the historical budget of the Defense Department space program in 2004 adjusted dollars:

Table 1. Space Activities of the U.S. Government

BUDGET AUTHORITY IN MILLIONS OF EQUIVALENT FY 2004 DOLLARS					
(adjusted for inflation)					
FY	DOD	FY	DOD	FY	DOD
1959	2,546	1978	6,865	1998	13,723
1960	2,870	1979	7,132	1999	14,484
1961	4,114	1980	8,366	2000	14,013
1962	6,468	1981	9,651	2001	15,206
1963	7,638	1982	12,160	2002	16,321
1964	7,782	1983	15,368	2003	19,738
1965	7,570	1984	16,637	2004	20,019
1966	7,985	1985	20,095		
1967	7,702	1986	21,533		
1968	8,619	1987	24,262		
1969	8,717	1988	25,666		
1970	6,949	1989	25,203		
1971	5,937	1990	21,158		
1972	5,262	1991	18,525		
1973	5,796	1992	18,915		
1974	6,041	1993	17,325		
1975	6,036	1994	15,812		
1976	5,730	1995	12,514		
TQ*	1,240	1996	13,258		
1977	6,301	1997	13,249		

* Transition Quarter

Source: National Aeronautics and Space Administration 2004, *Aeronautics and Space Report of the President: Fiscal Year 2004 Activities*, 123.

U.S.S.R. Resources

All estimates of space spending are rough orders of magnitude primarily due to Soviet secrecy. Conventional wisdom from released U.S. intelligence estimates the Soviet spending rate at approximately 1.5 times that of the U.S. (U.S. Senate 1989, 513). A monetary figure is hard to pinpoint concerning Soviet economic burden. It is known that the Soviets typically launched many more satellites per year than the U.S. This was primarily due to Soviet spacecraft design differences. Soviet spacecraft have comparatively shorter operational life spans than their western counterparts do. Soviet designs are also narrower in their purposes, this creating the need to launch more satellites to perform the same amount of missions as western satellites (U.S. Senate 1989, 514).

While a higher launch capacity could mean USSR would reconstitute satellite forces more quickly than the U.S. (U.S. Department of Defense 1987, 12), spurning U.S. fears of ASAT conflict, it also means much more money and resources devoted to launch operations. Logically, one could assume that this would pose a significant economic burden on the Soviet economy.

Conclusions on Resources

In response to the perceived Soviet threat, the U.S. continued to increase its space budget from the launch of sputnik until the break-up of the U.S.S.R. The only notable exception in the decline of space spending was during the latter part of the Vietnam war (see table 1 above). Despite economic recessions and fierce competition for limited resources, the U.S. has considered the benefits of the space program worth the enormous expenditure. This expenditure reached a crescendo during the Reagan administration

with the Strategic Defense Initiative (SDI) program. With the break-up of the Soviet Union, and the perceived absence of a credible threat, space spending was reduced, only to recently be expanded again due to space support to the Global War on Terrorism (GWOT).

The Soviet Union's funding of its space program is difficult to measure because of the lack of transparency in accounting. Given the expensive nature of a space program, the economic burden of the Soviet's ambitious space program to match the west may have been so much so, that it contributed to the collapse of the Soviet government.

U.S. Technology

Technology as defined in this paper refers to a nation's technical capabilities, including space weapons systems.

The following are brief descriptions of the various ASAT systems referenced throughout this paper.

- 1960 – United States Air Force began development of the Satellite Interceptor (SAINT) program. Despite its misleading designator, the SAINT system was originally designed to be a Co-orbital Satellite Inspection system, with later design modifications to make it capable of destroying a satellite (Stares 1985, 112). It was eventually cancelled due to lack of funding, and competition with NASA's manned space program (Stares 1985, 73).
- 1962 – 1967 Secretary McNamara instructs the Army to develop the MUDFLAP ASAT system (also known as project 505). This nuclear armed, direct ascent ASAT system tested successfully and became the first operational U.S. ASAT system in 1963 (Stares 1985, 76). Due to the emergence of the Air Force's Project 437, this system was phased out.

- 1963 – 1975 USAF develops and deploys Project 437 ASAT system. This system was initially employed in conjunction with the Army’s MUDFLAP system. Project 437 was also a direct-ascent, nuclear armed ASAT system. Due to prevailing political thought on the need to present a “peaceful” use of space, and the diminishing utility of a nuclear-tipped ASAT system, the Air Force began converting project 437 missiles to non-nuclear means of destroying satellites. This project was renamed “Program 922”, but initial promised funding was diverted to the war in southeast Asia. With reduced funding, no further systems were produced, and the program was relegated to concept studies (Stares 1985, 129).
- 1982 – 1985 MHV ASAT. President Reagan had devoted much of the nation’s resources to modernizing the military, and ASAT weaponry was no exception. The first successful satellite intercept test for the United States was with the MHV ASAT. This vehicle was air launched from an F15 in a vertical climb. Although this program was successful, it was also controversial, and funding was cut from the program by the democratic congress in 1988 (Grego 2008, 7).

U.S.S.R. Technology

The following is a brief description of the Soviet ASAT systems referenced in this paper.

- 1960 – 1982 The U.S.S.R.’s only type of documented ASAT weapon was the Istrebitel Sputnikov (IS). The IS ASAT was a Co-Orbital system designed to launch into space, and orbit around the Earth, guiding itself closer to its target satellite. The IS was initially radar guided, and would close within range of its target and explode, using the subsequent shrapnel to destroy the targeted satellite (Grego 2008, 2). Of the 20 ASAT tests

conducted by the Soviet Union, unclassified data shows 9 successes and 11 failures, or a roughly 45% success ratio (U.S. Senate 1989, 327-8).

- During the later half of the 1980's the Soviets also developed and attempted to deploy the Polyus Battle Station. As indicated in the Encyclopedia Astronautica Web site, this space station was designed to carry ASAT interceptors and was a developmental response to the U.S. SDI program. While ambitious in its concept the initial test vehicle failed to reach orbit, and the program was discontinued.

Conclusions on Technology

U.S. endeavors into the ASAT program have produced the most sophisticated ASAT systems in the world today. Even though the last specific ASAT program was cancelled in the 1980's (Grego 2008, 7), the U.S. has recently utilized ABM technology to target and engage a satellite, giving credence to the concept of dual-use technology. The U.S. has by far the most robust technical capability in the space realm. The U.S. has historically placed an emphasis on installing the latest technologies in their space platforms. They also aggressively seek to upgrade existing systems to expand and enhance their capabilities and for this reason; the United States has both the greatest space-based capability, and greatest vulnerability.

The Soviet Union lost the "space race" to the U.S. due to its lack of sophisticated technology. While Soviet spacecraft designs were adequate to perform their designated tasks, their narrowly specialized functionality required many more resource-draining launches in order to achieve the same functionality as a comparatively fewer amount of "multi-function" U.S. satellites. Even the Soviet ASAT program, which initially inspired

fear in western policymakers, had a rather dubious success rate. This may have been why the Soviet Union eventually abandoned an active ASAT program, and intensely pursued a diplomatic course to stop U.S. ASAT and ABM development. When it came down to basics, the Soviets just could not keep up technologically.

Findings of the Peoples Republic of China Space Program Lines of Effort

Vision

The vision of the Chinese space program began with Chairman Mao at the beginning of Communist China. As early as 1956, Chairman Mao was said to have called for the rapid development of science and technology (Harvey 2004, 22). Initially, this interest was fueled by the need to catch up to the other great powers of the U.S. and the Soviet Union, but with the international prestige gained by the Soviets with the launching of Sputnik, Chairman Mao soon realized the value of a space program. With his declaration of support for China to launch a satellite, the Chinese space and rocket program was born (Harvey 2004, 22).

Unfortunately, that same year (1958), China was in the midst of the “Great Leap Forward” a national campaign initiated by Mao where China would rapidly increase its agriculture and industrial production (Harvey 2004, 332). National campaigns to produce steel and rid China of pests (mosquitoes, rats and sparrows) resulted in the collapse of the economy and mass starvation (Harvey 2004, 332). Due to the extremely limited resources of China, in 1959 the Chinese satellite program in placed on hold indefinitely. Instead, Chinese leadership under Mao opted to focus its resources on the immediate need to produce military missiles (Harvey 2004, 28).

Work continued as a relatively steady pace on rocket development until the advent of the Cultural Revolution in 1966. The Cultural Revolution, instituted by Chairman Mao, encouraged young people (known as the Red Guards), to reinforce the communist revolution by seeking out counter-revolutionary elements and thought. It lasted 10 years, and severely disrupted the space program by placing China's scientists at risk of re-education and work assignments in farm fields (Harvey2004, 332). During the Cultural Revolution, the nation's focus was primarily on an internal power struggle, and scientific and technological advancement all but ceased (Harvey 2004, 51).

After the death of Mao in 1976, there was a brief power struggle with "the gang of four", a group of four people led by Mao's wife (Jian Qing) who tried to maintain the revolutionary path of the Cultural Revolution (Harvey 2004, 332). The gang of four seized power after Mao's death, but was quickly overthrown in a military coup (Harvey 2004, 332).

In 1978, Deng Xiao Ping emerged as China's Premier, and set about restoring order for the nation (Harvey 2004, 332). His plan to improve China became known as the "Four Modernizations", where he concentrated the nation's efforts in modernizing agriculture, industry, science and defense (Harvey 2004, 332). Deng Xiao Ping's leadership remained stable throughout the 70's to the 90's. Under him, China began to develop a modernizing effort that reached into the space program as well.

Perhaps the most telling of the Chinese vision for its space program is the Chinese White paper on space activities. This paper, produced annually, outlines the Aims, Principles, and goals for China's space program.

This paper will examine the most recent White Paper in 2006, with the White Paper of 2000. The purpose of this is to illustrate some of the progress the Chinese have made in the last five years in their space program.

The 2000 White Paper on Space Activities states that the aims of China's space activities are:

“to explore outer space, and learn more about the cosmos and the Earth; to utilize outer space for peaceful purposes, promote mankind's civilization and social progress, and benefit the whole of mankind; and to meet the growing demands of economic construction, national security, science and technology development and social progress, protect China's national interests and build up the comprehensive national strength” (2000, 1).

Peoples Republic of China, *China's Space Activities in 2000*

These aims appear to be solidly in line with the Chinese government's vision, as it has not changed in the 2006 White Paper. In addition to the aims of the space program, the 2000 White Paper defines how it will achieve its aims by outlining the following principles:

1. Adhere to long-term sustainable stable development, and making space activities serve the state's comprehensive development strategy (5-year plan).
2. Uphold self-reliance and self-renovation. China will rely on its own resources to make breakthroughs in space technology.
3. A limited number of projects vital to economic and social development will be concentrated on to achieve breakthroughs in key fields.

4. Enhance social and economic returns of space activities to create an economical and efficient space program.
5. Stick to an integrated plan encompassing short and long-term development. This applies to spacecraft and ground equipment.

The 2006 White Paper makes little change to these principles, but it does present a few additions:

1. In addition to self-reliance, China will strengthen its exchanges and cooperation with other countries on the basis of equality, mutual benefit, peaceful utilization of outer space and common development.
2. Continued focus on select projects vital to economic and social development will enable China to realize “leapfrogging” development through fostering independent innovation in the space industry.

The 2000 White Paper vision for China’s space program is increasingly dependant on Satellite Applications. To that end, it has identified the following critical applications China will focus its resources developing:

1. Remote Sensing – to assist in the development of situational awareness of the planet, including meteorology, mining, agriculture, forestry, water conservancy, oceanography, seismology and urban planning

2. Telecommunications – to enable China to bring communication and broadcasting capability to the remotest parts of the nation, without having to build expensive ground communications relays throughout the country (an example of leapfrogging technology).
3. Navigation – to develop a national position-locating system similar in size and scope to American GPS.

The 2006 report re-iterates the importance of these space applications, and re-affirms China's commitment to realizing these applications. To realize the space applications, the White Paper outlines both short-term and long-term developmental targets. The targets in 2000 were:

1. develop a long-term earth observation system enabling remote sensing of terrestrial phenomenon
2. establish independently owned broadcasting and telecommunications system
3. establish independent navigation system
4. upgrade launch vehicles
5. realize manned space flight
6. develop space science and explore outer space

The 2006 White Paper varies slightly since the launch of China's first manned spaceflight in 2003. Since that target has been met, the new target is to begin deep space exploration, with advanced studies on a lunar-orbiting project. Additionally the 2006 paper adds the following:

1. develop non-toxic launch vehicles that are cheaper, safer, more efficient, and effective
2. continue to improve the "Beidou" navigation satellite test system. With the goal of worldwide coverage
3. develop and launch "breeding" satellite to promote integration of space technology and agricultural science research
4. develop scientific satellites such as space telescopes and recoverable experiment satellites for research in space astronomy, physics, micro-gravity, life sciences, and monitor space debris
5. enable astronauts to conduct extravehicular operations and spacecraft rendezvous and docking on space laboratories
6. realize a lunar orbiting probe

Conclusions on Vision

Overall, the vision of the Chinese space program has remained constant to what Chairman Mao envisioned in 1956, to modernize and secure the nation's future. While ambitious goals were set early for the space program, political and social upheavals such as the Great Leap Forward, and the Cultural Revolution threatened to destroy the

intellectual capacity of China before it could create an effective space program. As it was, these events significantly delayed the full realization of China's space development and created the present situation of years of lag behind the U.S. and Russia technologically.

China's vision for its space program has run along similar lines as the U.S. and U.S.S.R. Much like these powers, the initial vision from Chairman Mao was to develop China's missile and rocket technology to establish a strategic nuclear capability and secure the Chinese Communist Party's regime. In addition to national security, however, the importance of displaying to the world the unilateral effort of the Chinese people to conquer space seemed to be just as important to the Chinese leadership.

The latest Chinese White Papers on space continue to point out their increasing need for space capabilities. Most interesting however is the call for China to focus its resources in increasing space capabilities in the Remote Sensing, Telecommunications and Navigation applications. While all of these applications do have legitimate peaceful civilian applications, they are also directly beneficial to military applications. The White Paper further calls upon the need to develop faster, cheaper, and more efficient rockets, as well as increase the ground launching and tracking abilities. All of this effort is to increase the ability of China to place more satellite constellations in orbit. For any nation to be a space power, it must be able to build, launch, manage, and direct payloads into space. China has demonstrated that it has a vision to accomplish this and indeed has the national will to carry out a robust space agenda.

Ultimately, China is no different from the U.S. and U.S.S.R. with respect to space and national security. As its space capabilities grow, so too does its reliance upon those

capabilities. The need to protect its space assets will force China to equate the control of space with ensuring national security.

Doctrine

As the White papers on the space program illustrate, the efforts of the Chinese appear to be entirely peaceful in nature. An examination of the White Papers for defense will also illustrate the military aspects of the Chinese Space Program. Again, this paper will utilize two white papers to illustrate the changes over a five-year period, and what these changes may indicate about the Chinese thought process, and where it is headed.

White Papers on Defense present a broad overview of Chinese national defense policy. The first section outlines the Chinese assessment of the current security situation.

The 2000 White Paper begins by warning of a world where:

“Hegemonism and power politics still exist and are developing further in the international political, economic and security spheres. Certain big powers are pursuing ‘neo-interventionism’ ‘neo-gunboat policy’ and neo-economic colonialism, which are seriously damaging the sovereignty, independence and developmental interests of many countries, and threatening world peace and security” (2000, 1).

Peoples Republic of China, *China’s National Defense in 2000*

While the 2006 White Paper states:

“Hegemonism and power politics remain key factors undermining international security” (2006, 2).

Peoples Republic of China, *China’s National Defense in 2006*

While the theme of hegemonism is consistent in both papers, the language of the 2000 paper appears much more explicit, mentioning “certain big powers.” While not specifically mentioning the U.S., there is little doubt that China is referring to fears of perceived American Hegemony.

The security assessment also devotes many paragraphs to Taiwan. The language between the two papers is most pronounced here, with the 2000 paper describing the Taiwan situation as “complicated and grim” and contends, “Separatist forces in Taiwan are scheming to split the island province from China, in one form or another” (Peoples Republic of China 2000, 2).

The paper also specifically mentions perceived U.S. involvement in Taiwan as some sort of greater tactical missile defense (TMD) effort:

“The United States has never stopped selling advanced weapons to Taiwan. Some people in the United States have been trying hard to get the Congress to pass the so-called Taiwan Security Enhancement Act. And some are even attempting to incorporate Taiwan into the US TMD system” (2000, 2)

Peoples Republic of China, *China’s National Defense in 2000*

China then warns:

“These actions have inflated the arrogance of the separatist forces in Taiwan, seriously undermined China’s sovereignty and security and imperiled the peace and stability of the Asia-Pacific Region” (2000, 2)

Peoples Republic of China, *China’s National Defense in 2000*

Conversely, the 2006 White Paper is significantly toned down in its rhetoric. In fact, it even places a positive spin on Cross-Strait relations:

“The Chinese government has taken a number of significant measures to improve relations across the Taiwan Straits, thus promoting cross-Straits relations towards peace and stability” (2006, 3).

Peoples Republic of China, *China's National Defense in 2006*

Still, the 2006 paper continues to take issue with the U.S. and Taiwan:

“The U.S. has reiterated many times that it will adhere to the ‘One China’ policy and honor the three communiqués between China and the U.S. But, it continues to sell advanced weapons to Taiwan, and has strengthened its military ties with Taiwan” (2006, 3).

Peoples Republic of China, *China's National Defense in 2006*

While the language has toned down considerably in the 2006 paper, China still seems to have issues with U.S. arms sells to Taiwan. The tone of this document still illustrates a potential flashpoint between the U.S. and China in the near term; particularly when the 2006 paper still maintains: “opposing and containing the separatist forces for Taiwan independence” (Peoples Republic of China 2006, 4).

The 2006 White Paper on Defense also gives insight to reconciling old doctrinal ideas with new concepts in warfare. The 1991 Gulf War illustrated quite clearly the Chinese leadership that high-tech opponents such as the United States utilized rapid, highly devastating attacks to render the Iraqi defenses ineffective. The weakness of the Iraqis, as seen by the Chinese, was that they waited for the U.S. coalition to initiate the battle. An opportunity the coalition forces took with devastating effectiveness.

This battle gave weight to the Chinese concept of preemption, or “Active Defense”, where “aggressive actions are designed to buy time, secure battlespace initiatives and momentum before enemy threats are assembled, and to cut, if possible, a

technologically advanced opponent force down to a manageable level so that he might feel compelled either to delay his offensives or to take more time to regroup his forces to counter the degradation of his defenses” (Mulvenon and Finkelstein 2005, 48). While this concept has Chinese-specific characteristics, it still bears a resemblance to the U.S. doctrinal principle of initiative.

This concept of active defense has been used by China to great effectiveness historically. It can be argued this doctrinal concept was the primary motivator for China to send the PLA into Korea, when the U.N. Forces began crossing the Yalu River. In the Chinese view, conducting a quick, psychologically shocking strike to the enemy’s battleground potentially has the power to diffuse any escalation of conflict, and create favorable conditions towards political settlement, without becoming drawn into a protracted war on one’s own soil.

The 2006 White Paper on Defense also depicts the PLA high command as enamored with the concept of information warfare. To that end, several statements on “informationalizing” their combat systems are mentioned, beginning with attributing the information concept to the United State’s success in the 1991 Gulf War. The Chinese perceived this conflict as bringing: “A revolution in military affairs developing in depth worldwide. Military competition based on informationalization is intensifying” (Peoples Republic of China 2006, 2). To that end, China’s national defense policy includes, “Enhancing the performance of the armed forces with informationalization” (Peoples Republic of China 2006, 4).

This also illustrates the Chinese desire to acquire information systems and pursue a strategy to modernize its national defense and armed forces, with the capability of

winning an informationized war by the mid-21st century (Peoples Republic of China 2006, 2).

In addition to information, the 2006 White Paper on Defense also illustrates a defense policy to mobilize the economy. This includes the space arena where China has established economic mobilization centers in space technology development:

“To speed up the development and application of new and high technologies and dual use technologies, and give priority to the mobilization of high-tech products and the reserves of high technology, to raise the overall scientific and technological level of economic mobilization” (2006, 19).

Peoples Republic of China, *China's National Defense in 2006*

This economy mobilization is not a new idea in Chinese military doctrine, but it does highlight a fundamental difference between Chinese and Western conventional thought by illustrating the notion that even the Chinese military (to include space programs) must modernize with an eye towards developing a healthy economy. In China's view, a healthy economy is the basis for national security. For without a healthy economy, modernization and upgrading cannot occur. This applies to the defense-related science field as well:

“China's defense-related science, technology and industry focuses on consolidating its foundation, making independent innovation, and speeding up the implementation of the strategy of transition and upgrading, so as to ensure the production and supply of military equipment and promote the development of the national economy” (2006, 23).

Peoples Republic of China, *China's National Defense in 2006*

Conclusions on Doctrine

China's White Papers on Defense, which can be considered the PLAs overall doctrine, directs to modernizing and restructuring itself to fight and win a short-duration, high-intensity conflict against high-tech adversaries. To achieve this, Chinese doctrine has adopted the concept of joint operations, and actively calls upon the PLA to increase joint training and education among its leaders in order to improve its ability to operate in a joint environment. Another factor is the Chinese concept of Active Defense.

The Chinese saw full well the consequences of allowing a high-tech adversary such as the U.S. time to mass its forces and prepare for an attack. China understood that to cede the initiative to the enemy in this case is to ultimately lose the war. Consequently, the goal of the Chinese leadership is to build a military capable of seizing the initiative and winning an "informationized" war, by the mid-21st century.

This type of warfare, which the Chinese see as the future of war, relies intensely upon their forces to gain and control information in order to outthink, outwit, and outmaneuver the enemy. As the United States demonstrated in the 1991 Gulf War, this type of information dominance is heavily reliant upon space assets. This is particularly true if a nation is projecting its force into an austere environment. China's focus on building and informationized force and fighting an informationized war would naturally prevent such a force having a robust space system to meet its needs.

National Power

In the arena of Arms Control, the two papers are exceedingly different. The 2000 paper provides numerous details on China's efforts to promote disarmament efforts (Peoples Republic of China 2000, 5). One of the acute distinctions of the 2000 paper is

the Chinese perceived link between Arms control and the 1972 ABM treaty. Indeed, China seems to consider nuclear proliferation and ABM defense as interconnected as they even refused to participate in the convention that prohibits production of fissile materials, for nuclear weapons purposes (FMCT). Their stated position was, “continued nuclear disarmament and the prevention of an arms race in outer space are multilateral forms of arms control that should be given more priority than FMCT negotiations” (Peoples Republic of China 2000, 6).

China goes on to further clarify its support for the ABM treaty by stating that they opposed the U.S. pursuit of a ballistic missile defense system and presented a joint Sino-Russian resolution on the “Preservation of and Compliance with the Anti-Ballistic Missile Treaty” (Peoples Republic of China 2000, 6). China also reveals the probable cause for all of their ABM opposition by referencing Taiwan and stating they also strongly oppose any such TMD assistance to the Taiwanese, and any attempt to incorporate Taiwan in any form of the TMD system.

The 2000 paper also addresses space weaponization by stating:

“China is strongly opposed to an arms race in outer space” (Peoples Republic of China 2000, 7), and “Such activities as the testing, deployment or use of weapons, weapon systems or their components should be banned in outer space, in order to prevent the militarization of and an arms race in outer space” (Peoples Republic of China 2000, 7).

China also continued to support arms control for space by acknowledging the previous agreements on regulating space activities, but states: “these instruments have not reflected the development of the most advanced aerospace technology today, and

therefore are unable to effectively prevent the militarization of or an arms race in outer space” (Peoples Republic of China 2000, 7). China then promotes the resolution on the Prevention of an Arms Race in Outer Space (PAROS), and calls upon the establishment of a U.N. ad hoc committee to negotiate a legal instrument on the prevention of the militarization of or an arms race in outer space (Peoples Republic of China 2000, 7).

What starkly contrasts the 2000 paper with the 2006 paper is the fact that none of the ABM or space arms race rhetoric appears at all. The Chinese appear to have dropped these subjects entirely. While the absence of ABM criticism could be attributed to the U.S. withdrawal from the treaty, the absence of space weaponization is harder to give reason. Additionally, China’s recent space vision as outlined in its 2006 White Paper on Space calls for increased cooperation with other countries on space activities. Recent examples of the Chinese cooperative space ventures include a 1992 China-sponsored Asian Pacific Multilateral Space Technology Cooperation Symposium, of which, nations such as Iran and Pakistan were attendees; and a 1993 Sino-German venture to develop and manufacture an aerospace satellite. In 1999, China worked with Brazil to develop and launch an earth resources satellite as well.

Conclusions on National Power

China continues to utilize its national power to advocate for arms control in space. The Chinese government has adopted treaties that specifically relate to space such as the Outer Space Treaty. Additionally, China has also co-sponsored the Prevention of an Arms Race in Outer Space (PAROS) treaty along with post-soviet Russia. These treaties call for the elimination of weapons of mass destruction, and other weapons in space respectively. While this portrays China as an advocate for the peaceful use of space, their

change in rhetoric from 2000 to 2006 on the weaponization of space, and their recent ASAT test would seem to signify a change in doctrine to a more pro-space weapon view.

In addition to arms control initiatives, the 2006 Chinese White Paper on Space calls for increased cooperative ventures with other nations for mutual scientific benefit. To that end, China has conducted numerous space research projects with Russia, Europe and Brazil. Additionally, China has made it a priority to coordinate cooperative space ventures with its regional neighbors through organizing and hosting various conferences on space exploitation.

While these international cooperation ventures are presented as “the basis of equality and mutual benefit, mutual complementarity and common development” (Peoples Republic of China 2006, 7). They can also carry other benefits. First, they allow China to acquire advanced technologies that may have military enhancement qualities. Secondly, they create a network of other nations that allows China to increase its international prestige, political influence, and build a space-tech customer base.

Organization

The Chinese space program has its official beginning in 1956, with the establishment of the Fifth Academy. This secretive, state-controlled entity’s purpose was to gather, direct, and resource China’s greatest scientists and engineers in order to begin rocket development. Their initial projects were the design and development of missiles capable of conducting long-range strikes.

In 1993, China established the Chinese National Space Administration (CNSA). Seen as the direct Chinese equivalent to NASA, this organization is nominally responsible for the Chinese space efforts. In addition to the civilian CNSA however, the

2nd Artillery is responsible for China's nuclear and ballistic missile fleet, as well as its military space projects (Solomone 2006, 312).

In 2006, the latest White Paper on defense called for a major force re-alignment of the PLA including the improvement of both nuclear and conventional missiles (Peoples Republic of China 2006, 5); an increase in manning of the Navy, Air Force and Second Artillery Force, while reducing the Army (Peoples Republic of China 2006, 9); and the building of an informationalized air fighting force (Peoples Republic of China 2006, 10). Given the restructuring of the Chinese military forces along these lines, it is evident that these organizational changes are in line with creating a joint, "informationized" force.

Conclusions on Organization

The Chinese space program mirrors the Soviet Union in its structure. While it does have a civilian organization responsible for all civilian space activities, the 2nd Artillery of the PLA, which controls all military space activities still controls most of the launching, tracking and other associated space support assets needed to conduct any space mission. Additionally, the Chinese Space program is also fundamentally secretive in nature. The lack of transparency on the part of the Chinese government to clearly define civilian and military space projects has led to confusion over the exact composition of the Chinese space program.

Regardless of whether the civilian or military carries out space activities, the decision to conduct any space mission still rests firmly within the CCP. Some experts have speculated that the Chinese ASAT test in January 2007 and subsequent 12-day delay of official comment about the test could be the result of unilateral action within the

2nd Artillery. This centralized decision structure similar to the Soviet Union makes such a notion extremely difficult to defend given that the PRC President is the Central Military Commission chairman, and all space activities must be approved by him (U.S. Library of Congress 2007, 4).

Resources

Historically, China has been unable to resource its space program adequately due to a monumental effort it has had to make from a rural, agrarian-based economy to a manufacturing and industrial based economy. Immediately following WWII, China's war-torn countryside could barely repair trucks or make bicycles. Throughout the 1950's and 60's, China struggled to develop its industrial capability and build its economy, while also enduring political upheavals like the Great Leap Forward and the Cultural Revolution. Upon the death of Mao and the emergence of Deng Xiao Ping, the political situation finally stabilized enough to enable China to make great strides in developing its space program. It was during this time that China increased its launch capacity, and even began to sell launch services to the commercial market in 1985. This effectively added commercialization to the space program.

While exact figures on the budget of the Space program are difficult to determine, in March of 2007 China announced a 17.8% increase in its military budget, bringing it to approximately \$45 billion (U.S. Department of Defense 2007, 25). This increase in defense spending continues to outpace the growth of the Chinese economy (U.S. Department of Defense 2007, 25). Additionally, the estimated budget for the Chinese space program in 2003 was between 1.4 and 2.2 billion.

In regards to future expenditure, the 2006 White Paper on Defense places resource emphasis on modernization; acquisition of high-tech weapons, information management and communications networks. Additionally it states:

“In 2005, the output value, added value and gross revenue of the entire spectrum of defense related science, technology and industry increased by 24.3%, 20.7%, and 21.6% respectively, over the previous year” (2006, 23).

Peoples Republic of China, *China's National Defense in 2006*

While it is difficult to determine the exact amount funded to the Chinese space program, their stated intent is to increase spending by an average of 22.2%. Additionally, the Chinese government has always stated the need to enable its Industrial base to seek ways to profit from space efforts. To that end, the defense industry enterprises have been transforming themselves to share-holding enterprises, with greater support being given to institutions engaged in strategic research (Peoples Republic of China 2006, 24). As an illustration of profit-making endeavors, Chinese technology patent applications have increased to an average annual rate of over 40% (Peoples Republic of China 2006, 24).

The bulk of China's budget has gone towards increasing its defense spending. This spending was explained as a necessary measure to correct a weak defense foundation from years of under-spending in the 1980s. From 1990 to 2005, China has increased annual defense expenditure by 15.36% (Peoples Republic of China 2006, 25).

The White Paper on Defense explains at length that the reason for all of the increased military spending is to transform and modernize its military. While China has attempted to downplay the significance of this spending, the amount and type of spending can equate to a build up of forces.

Conclusions on Resources

Similar to the U.S.S.R., locating accurate monetary amounts of the cost of the Chinese space program is difficult because of the lack of transparency. What is discernable however is that the Chinese lagged years behind the U.S. and U.S.S.R. during the 1950's to the 1980's, making only modest gains in their space program while they struggled to build their economy and industrial base. It has only been within the last twenty years that the Chinese economy has been robust enough to allow for increases in expensive ventures such as a national space program. Since then, the 2006 White Paper on Space has called for a series of ambitious goals to place approximately 100 satellites in orbit by the year 2010 (U.S. Department of Defense 2007, 27).

The Chinese have an ambitious space agenda, but are not foolish enough to allow for spending beyond their means to support a healthy economy. Indeed, both the White Papers on space and defense mention numerous times that the military and space programs exist to increase the strength of the Chinese economy. The Chinese appeared to have learned from the Soviet's mistakes in economics, and have applied these lessons learned to their space program. In the Chinese mindset, a strong economy ensures national security.

Technology

China has accomplished numerous technological achievements on par with the U.S. and Soviet Union during the last twenty years. In regards to space weapons technology, the only definitive Chinese space weapon is the 2007 test of a direct-ascent ASAT weapon and destroyed a Fengyun-1C Weather Satellite approximately 530 miles above the earth. The ASAT test, while successful, caused great international

condemnation due to the large amount of debris it left in orbit endangering other space assets.

Conclusions on Technology

The Chinese White Paper on defense calls for the need to make the PLA smaller and capable of winning short-duration “local wars under conditions of informationization” (Department of Defense 2007, I). In short, the PLA seeks to transform into a more modern force that can gain and maintain acute situational awareness, and deny such awareness to the enemy.

To realize this goal, China will need to develop a robust space capability that can support information-hungry weapons systems. While there is a clearly illustrated need to develop a robust space capability to support its military, the method of defending that space capability is not mentioned in the White Paper. However, the lack of an explanation from China on their ASAT test may very well have been a “read-between-the-lines” way of informing the U.S. that China does have the capability to defend its space assets. Therefore, much like the early exchanges between the U.S. and the Soviet Union, China has effectively displayed a deterrent capability to the escalation of a space war.

CHAPTER 5

CONCLUSION AND RECOMMENDATIONS

Conclusion

The Chinese ASAT program does not appear to challenge the U.S. freedom of maneuver in space, but does appear to be a national instrument to inform America that China will not allow the U.S. to dominate space.

Current Chinese counter-space efforts appear limited to their direct ascent ASAT system. While other systems involving lasers and micro-satellites have been speculated (Solomone 2006, 316), the Chinese ASAT program does not at this time appear to be technologically sophisticated, nor robust enough in scope to achieve space dominance, but it is capable of deterring any nation, including the United States, from targeting and destroying their space-based capabilities without the threat of retaliation.

Chinese stated policy on the use of space has been consistent with international law. Their diplomatic efforts to ensure space remains free for all to use for peaceful purposes has been a consistent theme in their White Papers. Similar to past Soviet efforts, Chinese diplomatic efforts to ban weapons in space, and weapons on earth that can engage space assets (i.e. ASATs), have been unsuccessful, primarily due to U.S. diplomatic objections (Hagt 2007, 36). The January 2007 Chinese ASAT test may very well have been a signal to the U.S. that China has changed their prior preference of arms control, and has embraced deterrence.

The PLA has always been the primary means with which China has secured its national security. The latest Chinese efforts to modernize and streamline their military are an indication that the Chinese Communist Party still believes the PLA is the primary

means of ensuring the survival of their regime. This massive modernization effort, which has only been possible due to the improvement in the Chinese economy, has included the call to “Enhance the performance of the armed forces with informationization” (Peoples Republic of China 2006, 4). This policy to modernize the PLA will continue to make it even more reliant upon space assets, thus the need to protect those assets becomes even more critical to the Chinese military. Additionally, the Chinese concept of “active defense” frames the use of ASAT weapons as a means that will protect against a technologically superior enemy with a critical strike before he has had time conduct his attack (Hagt 2007, 34).

Current U.S. space policy appears to signify an intention to dominate space. The 2006 U.S. space policy clearly states that the U.S. intends to use its space assets for “defense and intelligence-related activities in pursuit of national interests” (U.S. President 2006, 1), and that it will preserve its freedom of action in space, and “deny any adversary the use of space capabilities hostile to U.S. national interests” (U.S. President 2006, 2). This policy, which also states that it will oppose arms control measures designed to limit U.S. access to space (U.S. President 2006, 2), seems to leave the Chinese with limited options. They can accept either that the U.S. will control space, or develop a means to deter them from doing so should a conflict arise between the two nations. Given the increased reliance upon space assets, the Chinese cannot afford to ensure their national security without deterring America from attacking those assets.

Potential Outcomes

The PLA, which is still very much charged with defending Chinese national interests, will find that it has to develop an expeditionary force capable of projecting

power throughout the world. As Chinese interests in obtaining natural resources and political prestige elevate the nation to superpower status, the need for the PLA to support this will continue to rise. The 2nd Artillery, nominally the organization charged with Chinese military space activities, will continue to develop counter-space technology utilizing a variety of methods including lasers, jamming, kinetic kill vehicles, and micro satellites in an effort to deter the U.S. from engaging in a space war. Commercial space activities will continue to support both the Chinese economy, and produce military benefits to the PLA.

The upcoming U.S. Presidential election signifies an opportunity for America to change the current U.S. space policy and perhaps ease Chinese fears of American space dominance efforts. By examining the presidential candidates, Senators McCain and Obama, positions on Chinese space activities, this paper will make some judgments on the future of U.S. Space policy, and how it relates to China.

Republican presidential candidate John McCain has had a long record of supporting the Bush administrations space policy. On the issue of America's space program, Senator McCain states "He is proud to have sponsored legislation authorizing funding consistent with President Bush's vision for the space program" (McCain Campaign Web site, 2008). Additionally, he "strongly supports the development and deployment of theater and national missile defenses" (McCain Campaign Web site, 2008). He justifies the need to develop a missile defense system "to hedge against potential threats from possible strategic competitors like Russia and China" (McCain Campaign Web site, 2008).

On the subject of China, Senator McCain has stated he supports the one-china policy (On the Issues Website 2008), and did not advocate for Taiwanese independence. However, he has been noted as stating he supports political reform in China, and wants to guard against Chinese threats to U.S. strategic interests in Asia, and reduce the growing threat to Taiwan from a Chinese missile attack (On the Issues Website 2008). Senator McCain favored admitting China to the World Trade Organization (WTO), (On the Issues Website 2008), and generally favors engagement with China, but not at the expense of U.S. security (On the Issues Website 2008).

If Senator McCain were to continue to pursue an aggressive ABM policy, a noted object of contention in the Chinese 2000 White Paper on Defense, then it would be likely that China will continue to pursue its path of space weapons development, if for no other reason than as a deterrent. While the likelihood of a conflict with China over Taiwan is low, a policy that continues to make arms sales to Taiwan could aggravate China into military action.

Senator Obama's Plan for American Leadership in Space specifically addresses the Chinese ASAT test, and includes the proposal to keep weapons out of space, stating: "China's successful test of an anti-satellite missile in January 2007 signaled a potential new arms race in space. Barack Obama does not support the stationing of any weapons in space. He believes the international community must address the issue of space weaponization head-on and enter into a serious dialogue with Russia, China and other nations to stop this slow slide into a new battlefield" (Popular Mechanics Website 2008). Given this stance on space weapons, it would appear likely that Senator Obama would alter U.S. space policy to reflect a strict prohibition on the development and employment

of ASAT weapons. Additionally, Senator Obama has questioned the operability of the ABM system and would like to see the technology be more reliable before it is deployed further (Bloomberg Website 2008).

On dealing with China, Senator Obama seems to favor a more diplomatic and economic engagement track, than the current administration. He has stated that China is not an enemy, but a competitor (On the Issues Website 2008). He has also openly criticized China's monetary policy and has suggested tougher enforcement of trade agreements with China (On the Issues Website 2008). Positions such as these would indicate that Senator Obama is more amenable to negotiating with China.

China could stand to gain much in the realm of renewed arms control negotiations with the U.S. should Senator Obama become the next President. His willingness to directly address this issue could do much to quell Chinese fears of American space dominance. Additionally, the Chinese may be able to accomplish much of their national interest objectives through dialogue with the U.S., rather than deterrence. However, the Obama administration would also seem to want to ensure China observes fair trade practices, and this contention could lead to an escalation in military and space tension.

China is at a crossroads in its space development. Should the U.S. continue to pursue a space policy projecting a stance that it will control space if it feels its security is threatened, then China will continue to challenge what it perceives as U.S. space domination.

However, if the U.S. were to re-address space weapon arms control measures, as well as alter its space policy to secure the safety of every nation's space assets, then China may very well reduce its effort into military applications for space. Given a much

milder political space climate, China would probably pursue a more robust civil space program designed to compete against the U.S., but not threaten it militarily.

Should Senator McCain become the next President, space policy and engagement with China will probably not change appreciably. His current stance on space and missile defense does not appear much different than the current administration, and does not offer any new insight to any major policy differences. Were Senator Obama to be the next President, U.S. space policy would most likely change to a less alarming tone.

GLOSSARY

Active defense. Aggressive actions designed to buy time, secure battle space initiatives and momentum before enemy threats are assembled, and to cut, if possible, a technologically-advanced opponent force down to a manageable level so that he might feel compelled either to delay his offensives or to take more time to regroup his forces to counter the degradation of his defenses. (China's Revolution in Doctrinal Affairs: Emerging Trends in the Operational Art of the Chinese People's Liberation Army)

Ballistic missile defense (BMD). A generic term in military strategy and associated systems to shield an entire country against incoming Intercontinental Ballistic Missiles (ICBMs). The missiles could be intercepted by other missiles, or possibly by lasers. They could be intercepted near the launch point (boost phase), during flight through space (mid-course phase), or during atmospheric descent (terminal phase).

Battlespace. The environment, factors, and conditions that must be understood to successfully apply combat power, protect the force, or complete the mission. This includes the air, land, sea, space, and the included enemy and friendly forces; facilities; weather; terrain; the electromagnetic spectrum; and the information environment within the operational area. (Joint Publication 3-14)

Constellation. A number of like satellites that are part of a system. Satellites in a constellation generally have a similar orbit. For example, the Global Positioning System constellation consists of 24 satellites distributed in six orbital planes with similar eccentricities, altitude, and inclination. (Joint Publication 3-14)

Counterspace. Those offensive and defensive operations conducted by air, land, sea, space, special operations, and information forces with the objective of gaining and maintaining control of activities conducted in or through the space environment. (Air Force Doctrine Document 2-2)

Desert Storm. The First Persian Gulf War, Jan.–Feb., 1991, was an armed conflict between Iraq and a coalition of 32 nations including the United States, Britain, Egypt, France, and Saudi Arabia. It was a result of Iraq's invasion of Kuwait on Aug. 2, 1990; Iraq then annexed Kuwait, which it had long claimed.

Five Year Plan. The Five-Year Plan for National Economic and Social Development mainly aims to arrange national key construction projects, manage the distribution of productive forces and individual sector's contributions to the national economy, map the direction of future development, and set targets. In 1953, the central government implemented its first five-year plan. A total of ten five-year plans have been made and implemented to date. The five-year plan for 2006-2010 is called the 11th Five-Year Development Guidelines. (www.china.org.cn)

GPS. Global Positioning System: a U.S. space-based radio navigation system that provides positioning, navigation and timing services. The GPS is made up of three parts: satellites orbiting the Earth; control and monitoring stations on Earth; and the GPS receivers owned by users. GPS satellites broadcast signals from space that are picked up and identified by GPS receivers. Each GPS receiver then provides three-dimensional location (latitude, longitude, and altitude) plus the time. (www.GPS.gov)

Information operations. Actions taken to affect adversary information and information systems while defending one's own information and information systems. Also called IO. (Joint Publication 1-02)

Information warfare. Actions taken to achieve information superiority by affecting adversary information, information-based processes, information systems and computer-based networks while leveraging and defending one's own information, information-based processes, information systems and computer-based networks. Also called IW. (Joint Publication 1-02)

Informationized war. Chinese concept relating to conducting war with combat systems designed to gain and control information such as media, computers and communications systems. (Peoples Republic of China 2006, 4)

Reconnaissance. A mission undertaken to obtain, by visual observation or other detection methods, information about the activities and resources of an enemy or potential enemy, or to secure data concerning the meteorological, hydrographic, or geographic characteristics of a particular area. Also called RECON. (Joint Publication 3-14)

Revolution in Military Affairs. A major change in the nature of warfare brought about by the innovative application of new technologies which, combined with dramatic changes in military doctrine and operational and organizational concepts, fundamentally alters the character and conduct of military operations. (Dr. Andrew Marshall, Director of the Office of Net Assessment)

Space asset. Any individual part of a space system as follows. (1) Equipment that is or can be placed in space (e.g., a satellite or a launch vehicle). (2) Terrestrially-based equipment that directly supports space activity (e.g., a satellite ground station). (Joint Publication 3-14)

Space capability. 1. The ability of a space asset to accomplish a mission. 2. The ability of a terrestrial-based asset to accomplish a mission in space (e.g., a ground-based or airborne laser capable of negating a satellite). (Joint Publication 3-14)

Space control. Combat, combat support, and combat service support operations to ensure freedom of action in space for the United States and its allies and, when directed, deny an adversary freedom of action in space. The space control mission area includes: surveillance of space; protection of US and friendly space systems; prevention of an adversary's ability to use space systems and services for purposes hostile to US national security interests; negation of space systems and services used for purposes hostile to US national security interests; and directly supporting battle management, command, control, communications, and intelligence (Joint Publication 3-14)

Space environment. The region beginning at the lower boundary of the Earth's ionosphere (approximately 50 km) and extending outward that contains solid particles (asteroids and meteoroids), energetic charged particles (ions, protons, electrons, etc.), and electromagnetic and ionizing radiation (x-rays, extreme ultraviolet, gamma rays, etc.). (Joint Publication 3-14)

Space force application. Combat operations in, through, and from space to influence the course and outcome of conflict. The space force application mission area includes ballistic missile defense and force projection. (Joint Publication 3-14)

Space force enhancement. Combat support operations to improve the effectiveness of military forces as well as support other intelligence, civil, and commercial users. The space force enhancement mission area includes: intelligence, surveillance, and reconnaissance; integrated tactical warning and attack assessment; command, control, and communications; position, velocity, time, and navigation; and environmental monitoring. (Joint Publication 3-14)

Space forces. The space and terrestrial systems, equipment, facilities, organizations, and personnel necessary to access, use and, if directed, control space for national security. (Joint Publication 3-14)

Space parity. That condition wherein neither opposing force enjoys an appreciable advantage over the other in controlling the space domain. (Air Force Doctrine Document 2-2)

Space power. The total strength of a nation's capabilities to conduct and influence activities to, in, through, and from space to achieve its objectives. (Joint Publication 3-14)

Space sensor. An instrument or mechanical device mounted on a space platform or space vehicle for collecting information or detecting activity or conditions either in space or in a terrestrial medium. (Joint Publication 3-14)

Space superiority. The degree of dominance in space of one force over another that permits the conduct of operations by the former and its related land, sea, air, space, and special operations forces at a given time and place without prohibitive interference by the opposing force. (Joint Publication 3-14)

Space support. Combat service support operations to deploy and sustain military and intelligence systems in space. The space support mission area includes launching and deploying space vehicles, maintaining and sustaining spacecraft on-orbit, and deorbiting and recovering space vehicles, if required. (Joint Publication 3-14)

Space supremacy. That level of control in the space domain that one force enjoys over another that permits the conduct of operations at a given time and place without effective interference by the opposing force. Space supremacy may be localized in time and space, or it may be broad and enduring. (Air Force Doctrine Document 2-2)

Space surveillance. The observation of space and of the activities occurring in space. This mission is normally accomplished with the aid of ground-based radars and electro-optical sensors. This term is separate and distinct from the intelligence collection mission conducted by space-based sensors which survey terrestrial activity. See also space control. (Joint Publication 3-14)

Space systems. All of the devices and organizations forming the space network. These consist of: spacecraft; mission packages(s); ground stations; data links among spacecraft, mission or user terminals, which may include initial reception, processing, and exploitation; launch systems; and directly related supporting infrastructure, including space surveillance and battle management and/or command, control, communications and computers. (Joint Publication 3-14)

Space. A medium like the land, sea, and air within which military activities shall be conducted to achieve US national security objectives. (Joint Publication 3-14)

Space-faring nation. A nation with the ability to access space capabilities using their indigenous space systems. (Joint Publication 3-14)

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